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A New Occurrence of Vanadium in Peru.

BY FOSTER HEWETT.*

There was discovered, on Nov. 20, 1905, in the neighborhood of Cerro de Pasco, Peru, a new material containing vanadium, which, aside from scientific interest, will undoubtedly play an important rôle in the approaching commercial application of this metal. The following notes can only be considered preliminary, as it is hoped that within a short time complete analyses and all data pertaining to the geological nature of the deposit will be available for publication. I happened to be in Peru at the time of the discovery, was able to examine the district, and am now engaged in the microscopical examination of the eruptive rocks of the district. Complete analyses of the material and an associated oxidation product, will be made, it is hoped, by Dr. W. F. Hillebrand, of the United States Geological Survey.

The material was collected by several Indians in search of coal, in the main cordillera, and was taken to Señor Antenor Riza Patron, metallurgist of the Huaraucaca smelter, nine miles from Cerro de Pasco. Vanadium was recognized in high percentage, and a complete analysis was later made in the laboratory of the Corps of Engineers in Lima.

The physical properties of the material are as follows: Color, dark green, about the same as olivenite: cleavage, conchoidal to uneven; streak, greenish black; hardness, 3.5; specific gravity, 2.65. The following analysis was made by J. O. Handy, of Pittsburgh: Moisture, trace; silica, 10.88 per cent.; alumina, 3.85; iron, 2.45; vanadium, 16.08; sulphur, 54.06; molybdic oxide, 0.50; sulphur (soluble in carbon bisulphide), 6.55. Lead, zinc, copper, arsenic, antimony, lime, magnesia, gold, silver and platinum were sought, but were not recognized. Vanadium and iron are expressed as metals, because their exact condition is not yet determined. The amount remaining unaccounted for, is largely carbonaceous matter.

After a preliminary examination, Dr. Hillebrand, comments as follows: "I have found that the vanadium is wholly extractable by caustic alkali; that the residue then contains no iron soluble in hydrochloric acid, that the iron in the residue is in all probability in the form of pyrite, since it is dissolved with violence by nitric acid. After extraction of this pyrite, the final residue is still black, evidently from carbonaceous material. When this is burned off, a considerable residue of silicious nature remains. It would seem as if the vanadium compound must be a sulphide. In any case, there can hardly be any doubt as to its being a new mineral, and one of extreme interest."

It is my own opinion, from the analysis, that the material has no definite molecular constitution, but is rather more of the nature of a mixture.

Briefly, the conditions of its occurrence are as follows: Cretaceous sedimentaries composed of thin-bedded shales, sandstones and limestones have been intruded by two series of eruptives, and now lie with a dip of about 45 deg. The material occurs as a vein about 8 ft. thick, and, together with an associated vein of asphaltite, lies parallel to the bedding of the shales. The vein appears homogeneous, but the vanadium metal content varies from 9.5 to 15.7 per cent. (17 to 28 per cent. if considered V_2O_5). The asphaltite yields 3.31 per cent. ash, of which, 0.533 is vanadic oxide. The asphaltite is peculiar, as it contains about 45 per cent. sulphur, and though it will not hold a flame, burns, when heated, with the characteristic blue flame of sulphur. The exact analysis will undoubtedly be of interest.

A material, apparently intermediate in composition and nature between the vanadiferous material and the asphaltite, occurs between them. It is black, has a conchoidal fracture, and contains 2 per cent. ash, which is highly vanadiferous. A striking characteristic of this material is that it has a vesicular structure, and some of the cavities are filled with coked asphaltite. The appearance of the materials, as well as their occurrence, strongly suggests that they were forced into the shales in a plastic, or even liquid, condition. Subsequent metamorphism has altered both the composition of the asphaltite and the condition of the sulphur in the sulphide material. The details of the geological conditions need not be mentioned further, at this time.

Along a portion of the outcrop, the "sulphide" has been oxidized to a brown-colored mineral, resembling limonite, which is probably vanadium ocher. Large samples contain as high as 45 per cent. vanadic oxide.

I quote again from Dr. Hillebrand's letter: "The brown oxidation material, I agree with you in thinking, is probably derived from the sulphide. It contains a large amount of vanadium in the pentavalent state, somewhere in the neighborhood of 45 per cent., about 15 per cent. water, a little sulphuric acid, and about 14 or 15 per cent. iron oxide, besides 20 per cent., or more, of silicious gangue. It is, however, not a definite mineral species, but a mixture of several things. Whether the iron is in combination with the vanadium, either in whole or in part, I am unable to say with certainty. Close examination shows a greenish mineral forming coatings and composed of minute micaceous scales. Sometimes these appear to be yellowish. Whether the green and yellow are identical or not, they undoubtedly represent some combination of vanadium, of which several are known in nature. I should add that this oxidation substance contains also about 0.9 per cent. of molybdic oxide. It may very well be that the sulphide also contains some, although I did not test."

To date, the only development consists of a few prospecting pits extending along 400 ft. of the outcrop, but there is already a large quantity of the material exposed. From the above description, it is evident that the new material is richer in vanadium than any previously known. This feature, taken in connection with the large quantity available, appears to assure the commercial future of vanadium, if the many experiments during recent years, by Guillet, Kent Smith and others, are borne out by practice.

It is suggested, in appreciation of the work of the discoverer of the material, Señor Antenor Riza Patron, that it be given the name "patronite."

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A steel plant using the Stassano electric furnace is now in regular operation in Turin, Italy. The furnaces use scrap of all kinds—clippings from sheets, wrought scrap, small cast scrap, etc.—turning out sound ingots. The quality of the steel is shown by the fact that it is all taken by the motor-car factories of Turin.

Matto Grosso, Brazil.

BY ARMANDO BRANDENBURG.

The State of Matto Grosso is the second largest among the 20 States of the Brazilian federation, being exceeded in area by the State of Amazonas. It is 10 times the size of the State of New York, but is so sparsely populated that the most recent estimate shows only about eight inhabitants to the square kilometer. About one-sixth are Indians, of whom the more civilized gather rubber and medicinal barks and plants,and weave fibrous plants into hammocks and baskets, which find a ready sale. The cattle industry is a thriving one, but the chief source of wealth is found in the sale of *maté,* that wonderful tea which is the daily drink of countless thousands.

Geographically speaking, this State is the center of the Southern Hemisphere. It contains the sources of the immense water systems of the mighty rivers Amazon and La Plata. The capital, Cuyaba, claims less than 10,000 inhabitants and owes its existence to the neighboring gold deposits; 300 years ago the restless seekers after wealth worked their weary way up the rivers from Argentine and Paraguay, seeking the golden grains and the diamonds which were found in the *cascalho* (a gravel mixed with clay, superimposed upon the universal gneissic formation); these early adventurers suffered untold hardships from fevers and insects, but they remained long enough in action to demonstrate the great riches of the river beds and adjacent sandbanks. Gold is literally found all over the State and awaits the advent of modern machinery. There are also large deposits of iron ore which could be utilized under favorable transportation conditions. The drawbacks today are lack of means of communication and of a working population. There is plenty of timber in Matto Grosso (the name means "thick brushwood") and the forests serve to hide the wild Indians, about whom many unpleasant tales are told by the few explorers who have penetrated their tangled fastnesses.

Communication by land between southern Matto Grosso, northern Paraguay and the eastern slopes of Bolivia is extremely difficult; in the dry season the country is as wanting in water as it is overflowing in the wet months, and the pack animals frequently die of thirst or are drowned in trying to cross the torrential streams. The more comfortable way to reach Cuyaba is to board a river steamer at Buenos Ayres for Asuncion, the capital of Paraguay, a delightful trip of 1100 miles up the rivers Parana and Paraguay; 800 miles farther up the river, at Curumba, connection is made with a smaller steamer direct for Cuyaba, a total distance of 2500 miles from the Argentine metropolis. By making this trip there is an opportunity to visit the famous waterfalls of the Iguassu river, the bounday between Brazil and the Argentine Republic. These falls are 20 miles from the junction of the Iguassu with the great Parana river and about 1000 miles northeast of the mouth of the river Plate. The water falls 215 ft. over a sheer precipice and throws out and aloft enormous clouds of spray. On a calm day the thunderous roar may be heard 20 miles through these forest solitudes. The first view of the great cataract in its solitary grandeur is perfectly overwhelming; well is it named the "Niagara of South America."

The river Paraguay, the main affluent of the Parana, rises in Matto Grosso in the vicinity of the town of Diamantino, about lat. 14° 24′, and flows southwest along the foot of a high plateau, which divides it from the Cuyaba river to the east. The Cuyaba river, which is called the Sao Lourenço for 90 miles above its junction with the Paraguay, has its sources almost in touch with those of the Rio Tapajos; as it flows onward it is enlarged by a number of minor streams, especially from the northwest, until it reaches the spur of the great sandstone plateau, at the southeastern point of which the town of Cuyaba is situated. This plateau is only 650 ft. above sea level, showing how slight is the elevation of the interior of South America.

Another powerful affluent of the Parana is the Tiete. Together with the Rio Pardo this was the favorite route of the *Sertantistas,* explorers and raiders of Matto Grosso, who kept pushing farther into these unknown regions during the first half of the seventeenth century in their search for gold and precious stones. The Rio de la Plata is one of the four great entrances to the interior of South America. The most fertile part of Brazil lies within its drainage area, which includes the southern part of Matto Grosso, as well as the whole of Paraguay and southeastern Bolivia.

Another entrance to Matto Grosso can be effected by way of the river Madeira. This river has its junction with the Amazon 370 miles above Para and almost rivals it in the volume of its waters; it commences at the confluence of the river Guaporé with the Mamoré, both of which streams have their headwaters almost in contact with those of the river Paraguay. The upper course of the Madeira is obstructed by a formidable series of cataracts and rapids extending over a distance of 375 miles. Several attempts have been made to construct a line of railway around these rapids, and this will undoubtedly be accomplished and thus afford a ready outlet to the eastern Brazilian provinces as well as to the rich adjoining lands of Peru and Bolivia. The whole region may be said to be so nearly level that the rivers and minor streams, which find their way lazily across it, are among the most crooked in the world; while during the rainy season it is nothing but vast lakes and swamps, and is then practically uninhabitable.

The Federal Government is constructing a series of railways extending in several directions from Cuyaba, which already has telegraphic communication with Rio Janeiro. These railways will assure a more rapid settlement of this section of the country. At present the prohibitive cost of freight is preventing the development of the certainties in both rubber and gold-dredging operations. These low, inundated regions contain millions of rubber trees; enough rubber comes out now, with infinite hardship, to show the enormous value remaining, while the success of the several gold-mining companies, notably an Australian one, demonstrates the existence of the precious metal in attractive quantities.

Matto Grosso is not a part of the world where an American would live from choice. The climate is too humid and the fevers claim many victims; but there are chances for a rapid fortune to be made there which offer a certain charm to a man who can win by steadiness in work and moderate carefulness in living.

Proportioning Concrete.

In a paper by Sanford E. Thompson, read before the Boston Society of Civil Engineers, the author, after discussing various methods and tests, offers the following suggestions as guides to proportioning concrete:

1. The size of the largest stone in the aggregate should be as great as is consistent with proper placing of the concrete.

2. If size of stone is small, a richer mixture must be used; thus 1:3:6 is a fairly rich mix with 2-in. stone, but a lean mix with ½-in. stone.

3. If sand is fine, a smaller quantity may be used in proportion to the stone.

4. For concrete a sand with too large a percentage of very coarse grains may be detrimental because they will not fit into the voids of the coarse aggregate.

5. If the broken stone or gravel contains fine stuff, a smaller proportion of sand must be used.

6. Better proportions are obtained in practice by screening the sand or dust from the coarse material and remixing in required proportions, than by using the run of the bank or the run of the crusher.

7. If the mortar in concrete is rich, say, up to 1:2½, sand should be coarse, with comparatively few fine grains. A lean mortar, on the other hand, is improved not only in strength but in smoothness of working, by using a sand containing dirt or dust.

8. If fine sand must be used, the proportions must be richer than for coarse sand, because a fine sand makes a mortar of lower density.

Skip Hoisting.

BY S. A. WORCESTER.*

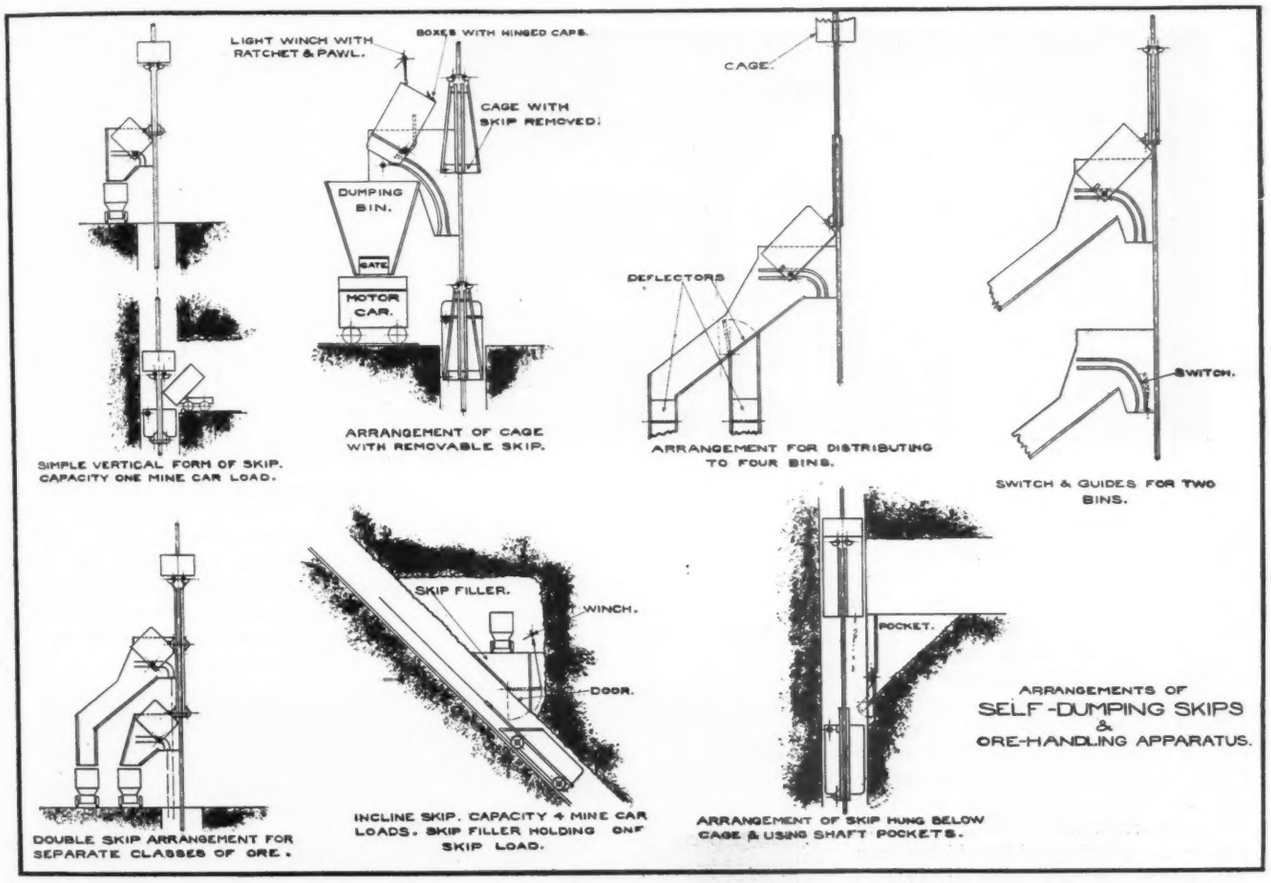
The advantages of the self-dumping skip for hoisting ore and waste rock are, I think, not nearly so well known and well considered as they should be among mining men generally. Having designed a number of skip-hoisting plants and made a specialty of this particular line of work to some extent, my attention has been drawn to the obvious advantages of the skip; and some comparisons with the cage, which is much more extensively used, may serve a useful purpose, if only to provoke discussion and elicit the views of others on this subject.

The first and most important advantage of the skip is its saving in labor. Assuming a skip hoist of the simplest form, in which the trammer in the mine level dumps his cars directly into the skip, and the skip dumps into a similar car at the surface, or directly into the ore bin, experience shows that a cager can dump a car into a skip in about one-half the time that is required to operate landing chairs and remove an empty and cage a full car. A similar saving is made at the surface, where a skip of ordinary construction is easily dumped in two or three seconds. If a proper lee-way of several feet in hight is allowed in the construction of the gallows frame and dumping guides, the skip can be hoisted and dumped very rapidly and stopped safely within the limit, whereas the cage must always be landed very carefully and accurately. There being no landing chairs at the levels and a variation of several inches being allowable in the position of the skip when loading, the stop can be made much more quickly than with the cage, with which a little too sudden landing damages both cage and chairs. Thus time and labor are saved in loading, hoisting, unloading and returning the skip.

In the case of a plant having a rapid and powerful hoist, so that fully two-thirds of the working shift is spent in caging cars, the substitution of a skip may easily double the hoisting capacity by its saving in time. In unbalanced hoisting, which is rather the rule than the exception in mines of moderate size in the Rockies, the dead weight of the cage and car is usually one and a half or two or more times that of the ore, whereas the weight of a skip need not ordinarily exceed one-half the weight of the ore being hoisted, so that the skip is much more economical of power than the cage. For this reason an engine of a given size can hoist a much larger load of ore with a skip than with a cage. A skip of two tons capacity will cost approximately the same as a single-deck cage with a one-ton car. The dumping guides, etc., for the skip, at the surface, will cost about as much as the landing chairs for the cage for a mine working three or four levels. When the number of levels exceeds four the landing rests will probably exceed the dumping guides in cost. I am assuming that the movable landing dogs are on the cage and operated by a lever.

In nearly every case where the plant can be planned before any working stations have been cut in the mine, a large saving in excavation can be made by installing bins, or pockets, at the working levels and filling the skip, or skips, from these pockets. A pocket of 10 mine-car-loads' capacity for a skip hoist will cost much less than the aggregate of excavation, tracks and cars for a 10-car station using the cage. In fairly hard rock the only timber or steel construction necessary will be for the front and gate of the pocket, the sides and sloping bottom being formed by the country rock. One car only is required for each trammer where hand tramming to pockets is the rule.

One objection which is sometimes advanced against the adoption of the skip is the inconvenience of handling men, timbers and mine supplies with it. To eliminate this objection, wherever counterbalanced hoisting makes the extra weight unobjectionable, the adoption of a cage is suggested for handling this part of the hoisting, with the skip suspended below the cage a sufficient distance to allow for filling. Wherever the extra weight and hight of the separate cage are undesirable,

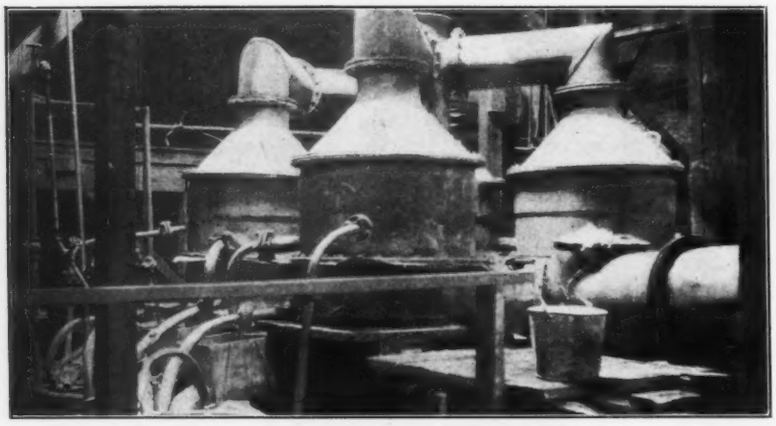

LIGHT WINCH WITH RATCHET & PAWL.
BOXES WITH HINGED CAPS.
CAGE WITH SKIP REMOVED.
DUMPING BIN.
GATE
MOTOR CAR.
SIMPLE VERTICAL FORM OF SKIP. CAPACITY ONE MINE CAR LOAD.
ARRANGEMENT OF CAGE WITH REMOVABLE SKIP.
CAGE.
DEFLECTORS
ARRANGEMENT FOR DISTRIBUTING TO FOUR BINS.
SWITCH.
SWITCH & GUIDES FOR TWO BINS.
SKIP FILLER.
WINCH.
DOOR.
DOUBLE SKIP ARRANGEMENT FOR SEPARATE CLASSES OF ORE.
INCLINE SKIP. CAPACITY 4 MINE CAR LOADS. SKIP FILLER HOLDING ONE SKIP LOAD.
POCKET.
ARRANGEMENT OF SKIP HUNG BELOW CAGE & USING SHAFT POCKETS.
ARRANGEMENTS OF SELF-DUMPING SKIPS & ORE-HANDLING APPARATUS.

*Consulting engineer, Victor, Colo.

it is an easy matter to mount the skip body on a cage, in such a way that the skip can be removed and hung safely out of the way in the head frame, or replaced on the cage, either operation being accomplished within one minute.

I find many mining managers who seem to have the idea that the self-dumping skip is adapted only to inclined shafts, whereas the fact is that its simplest and cheapest and most satisfactory form is that which is used in the vertical shaft. By giving the head frame sufficient hight, several sets of dumping guides may be used at different hights for dumping different classes of ore into different bins, or by arrangements of chutes and doors similar results may be accomplished. In a case where each mine car of ore has a trammer's tag sent to the surface with it and specifying which particular bin must receive it, and where it is desired to hoist a large tonnage, it is possible to use two skips, one above the other, in one frame and dumping simultaneously, each into its own chute which directs the ore to its proper car. This is feasible by placing the dumping guides which engage the roller on the lower skips farther from the shaft center than the dumping guides for the upper skip, so that the upper skip passes clear of the lower guides. This refers to vertical shafts. A similar result may be effected with inclined skips by the use of a simple automatic switch.

In an instance where the mine cars are hauled a long distance to the hoisting station in trains, a single large skip is used, holding four mine-carloads of ore, and making a trip of 1150 ft. and return. A pocket or skip-filler is used, holding exactly one skip-load and while the skip is making its trip, the skip-tender is busy filling the pocket by dumping cars into it. On the skip's return, the skip-tender opens the large gate at the bottom of the pocket and fills the skip with one rapid operation and without any danger of overfilling. The skip is thus kept almost constantly busy, waiting only a few seconds for loading. A skip can be used both for ore and water by the addition of a removable bottom-valve, or by covering the valve with a removable false bottom. Water is dumped in the same manner as ore and the valve accomplishes the filling. Under some circumstances the skip is a far more economical device for raising water than a steam-pumping plant. For some conditions, such as, for instance, a gravity tramway, a skip having a bottom door automatically opened and closed, is a useful arrangement. My observation of the excellent economy and wide adaptability of the skip justifies, I think, the prediction that it is almost certain to come into much more extended use.



ACID SCRUBBERS, MINERAL POINT ZINC WORKS.

The last New York legislature appropriated $10,000 toward the coöperative topographic survey of the State under the direction of the State engineer and surveyor. The director of the United States Geological Survey accepted the coöperation offered and provided an equal amount of Federal funds for this work. Field work was begun about June 15, and will be continued until late in the fall. The area under survey covers parts of Orange, Sullivan, Franklin, St. Lawrence, Ostego, Ulster, and Delaware counties.

The Mineral Point Zinc Works.

STAFF CORRESPONDENCE.

The Mineral Point Zinc Company, which is a branch of the New Jersey Zinc Company, makes sulphuric acid and zinc oxide, and also buys mixed concentrates of blende and marcasite, and by treating them in its magnetic separation department, produces high-grade zinc concentrate, which is shipped to the smelter at De Pue, Illinois, now in course of construction.

Magnetic Separation.—This department is equipped with two Galena roasters and a Cleveland-Knowles and a Ding separator. At present only one of the roasters and one of the magnetic separators are run at a time, but the whole plant will soon be in operation. The crude concentrates, which assay about 30 to 34 per cent. zinc, are taken in cars to a 12-ton iron hopper, which delivers through a stirrup feeder to the Galena roaster.

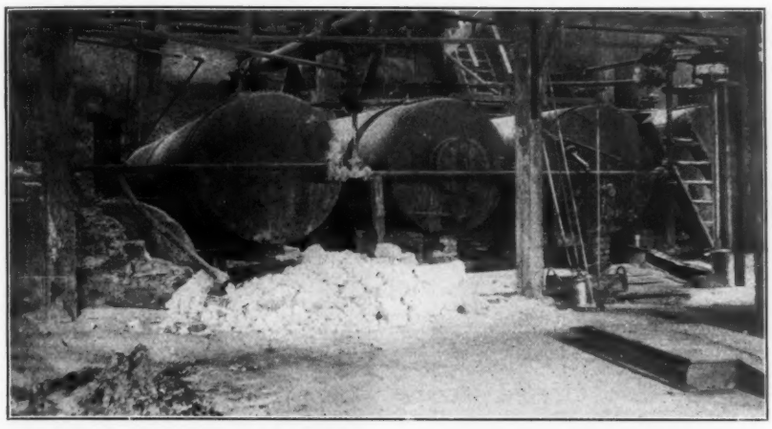
The Galena roaster is a revolving cylinder, set at a slight angle to the horizontal, lined with fire brick, some of which project so as to tumble the ore around and thus obtain a thorough exposure to the hot gases. At the lower end of the cylinder is the fire-box, while at the other end is a brick dust chamber. An iron smokestack, 50 ft. high, is mounted on top of the dust chamber. The ore discharges at the lower end of the cylinder into a chute going to a paddle conveyor (a rude form of conveyor designed on the principle of the log-washer). It takes about 2½ to 3 hours for the ore to pass through the cylinder. The paddle conveyor in the case of one of the roasters is about 26 ft. long, while that from the other is about 13 ft. long. A small spray of water is turned upon the hot ore as it issues from the cylinder. The amount is so regulated that the heat of the ore will drive it all off before the magnetic separators are reached.

ACID FILTERS, MINERAL POINT ZINC WORKS.

The first paddle conveyor feeds the ore to a scraper conveyor, which delivers it to a link-belt elevator working in an iron housing. The ore then passes

over a double trommel with ⅛-in. and ½-in. perforations. The oversize from the ¼-in. screen is very small in amount, but what little there may be is taken to the calcining department of the sulphuric acid plant. The undersizes from the ¼-in. and the ⅛-in. screens go to separate bins made of sheet steel and holding 5 tons each. One size and then the other size is fed to the magnetic separator.

The Mineral Point Company is testing a Cleveland-Knowles and a Dings separator side by side; apparently the two effect an equally good separation. Any difference between the two appears to be a question of mechanical construction. The Dings appears to be the better designed mechanically. The Cleveland-Knowles separator has been run continuously for eight months, and the only repairs required have been a few balls to replace some broken in the bearings supporting the revolving magnets, and also about a dozen 6x8-in. brass scrapers. Both the Dings and the Cleveland-Knowles separators have two magnets. The first requires 3 amperes, and the second 6 amperes, at 110 volts.



TANKS FOR MAKING FUMING ACID.

The magnetic separators divide the ore into three products, viz., an iron product; a middling product coming off the finishing magnet; and a zinc product, coming off the end of the table. These are taken by three screw conveyors to three elevators, where they are elevated to separate bins, and after being drawn off into cars are sampled and weighed.

The crude ore is also weighed and sampled so that at this plant accurate results are determined for each ore treated. The power to run this plant is furnished by electric motors. Fifteen horse-power is required to run one roaster and one separator, and the accessory machinery. About 25 h.p. will be required when both roasters and both separators are run constantly. The working force consists of a foreman (on day shift) and four men, two on each shift. These men work 12 hours and are paid $2 per shift.

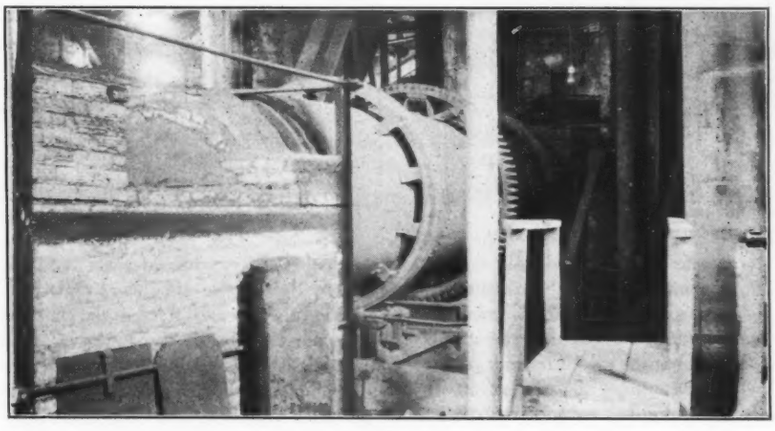
The ores treated vary considerably, but average from 30 to 34 per cent. zinc, or 44.8 to 50.7 ZnS, and 2 to 4 per cent. $CaCO_3$, the remainder being mainly iron sulphide. The final zinc product runs from 59 to 62 per cent. zinc, with about 2 per cent. iron. The tails from the separators carry about 2 per cent. Zn. The middlings, which amount to about one-third to one-quarter of the amount of iron separated out, carry from 7 to 10 per cent. zinc. The company is accumulating its middlings as it intends to try to treat them further on a type S, Dings separator.

It takes from 1.5 to 1.75 tons of coal per 24 hours to fire the roaster. The coal costs $3 a ton. About one-third of the sulphur in the iron sulphide is said to be burned off in the roasting. The roasting is controlled simply by the appearance of the roasted ore coming from the separator, and by the looks of the furnace. The percentage of extraction in the whole process varies with the ore, but it is between 80 and 90 per cent. of the zinc, probably averaging above 85 per cent. The capacity of the plant is 20 tons of crude ore per 24 hours. For treating 20 tons of ore the costs are: 4 men @ $2 = $8; coal, 2 tons @ $3 = $6; power, 15 h.p.; superintendence, one man @ $250 per month.

Suphuric Acid Plant.—Sulphuric acid is made from zinc blende by the Grillo-Schroeder contact process, the cinder being used for the manufacture of zinc oxide. The oxide plant was located here because of the large amount of zinc carbonate, which formerly was produced in this district, but owing to the decreased production of that class of ore, sulphide ore from the Wisconsin district and from more distant sources, is now treated. Large quantities of low-grade Colorado ore, carrying about 26 per cent. zinc have been used. The local ores are not treated in the oxide furnaces when they carry over 30 per cent. zinc, but instead are turned over to the magnetic separation department and converted into a high-grade zinc ore for the smelter at De Pue, Ill. All of the zinc carbonate ore goes directly to the oxide department.

The ore generally treated has already been crushed rather fine, so that it requires only a small amount of further reduction in size to be ready for the roasting furnaces; but as some of the ore is received in lump form there are also provided jaw crushers and coarse rolls. The crushed ore is shoveled into barrows holding 900 lb., and after having been sampled is dumped into the hopper of the drier, which is a revolving cylinder, made by the Allis-Chalmers Company, about 40 ft. long and 5 ft. in diameter. In this about 900 tons of ore are dried with a consumption of only one ton of coal in 10 hours.

The dried ore is raised by a belt elevator and passed over a Rowand inclined-tower screen, fitted with slotted sheet steel, the openings of which are ⅛ in. wide and ½ in. long. The undersize from this screen then passes to a Robins belt conveyor which carries it up an incline, 1:3, to a bin holding about 120 tons. The oversize from the Rowand screen is sent back to the rolls, where after being re-crushed it is returned to the elevator and again passed over the Rowand screen. The screened ore is drawn from the bin into cars holding from 1800 to 2000 lb., and after being weighed is trammed to the roaster.



GALENA ROASTER.

The roaster is of the improved type. This furnace is a double one, with seven

hearths, 80 ft. long, on each side. Inasmuch as considerable ore spills out over the ends of the hearths, when the rabble carriage issues therefrom, a car is placed so as to catch these partially roasted spillings, which are eventually returned to the furnace. The lower three hearths of the furnace are heated by gas from four Swindell producers. The burning of the sulphur of the ore keeps the upper hearths sufficiently hot.

The calcined ore is trammed away in cars and dumped down a sheet-iron spout, whence it falls into a pile where it cools. The ore while still warm is shoveled into dump carts and hauled to the oxide furnaces.

The sulphur dioxide is drawn off at the top of the furnace and taken to a brick dust chamber, where the cleaning of the gas begins. This dust chamber is fitted with baffle walls, so that the gas is forced to travel from top to bottom of the chamber several times before it finally escapes. This removes a good part of the flue dust, but there remain various gaseous impurities, such as moisture, sulphur trioxide and silicon tetrafluoride (SiF_4). These are removed by intimate mixture of the gas from the dust chamber with sulphuric acid of varying degrees of concentration, in lead-lined towers filled with coke or quartz according to the strength and temperature of the acid. The sulphuric acid, after having passed through cooling coils when necessary, is pumped back to the top of these towers by means of acid pumps and air lifts. This sulphuric acid is then evenly distributed over the top of the towers by means of a distributor, whence it trickles down over the coke or quartz filling, coming in intimate contact with the sulphuric dioxide which enters the towers at the bottom. The cleaning is further continued by passing the gas through lead scrubbers which work on the principle of the laboratory gas washing bottle, and effect a more intimate contact of the acid and the gas. The mist is removed by passing the gas through filters filled with coke. The last step in the purification is filtration of the gas through layers of asbestos fiber. The gas after passing through this purifying process shows no traces of dust or mist when examined in a flask by means of sunlight and a magnifying glass.

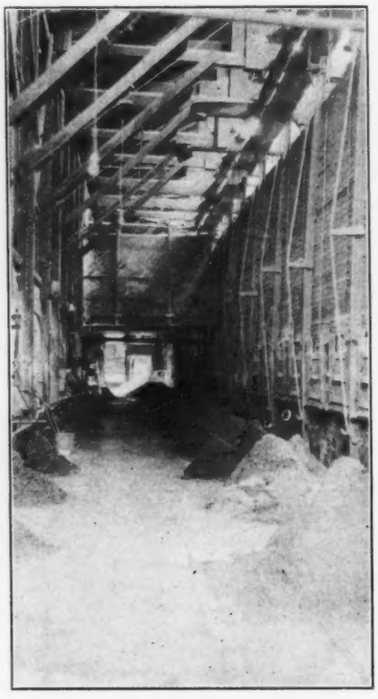
The gas which up to this time has been under a suction action is now forced by Connersville positive-pressure blowers through the conversion and absorption apparatus. Before the conversion into sulphur trioxide can be effected the sulphur dioxide must be heated to 400 deg. C. The conversion is effected by the catalytic action of finely divided platinum distributed on particles of magnesium sulphate. This platinum brings about a combination sulphur dioxide with the excess of oxygen (taken in at the roasting furnace) and sulphur trioxide is formed. After leaving the catalyzers the sulphur trioxide is cooled by passing it through iron pipes before the absorption begins. Finally the acid is pumped into iron tank cars for shipment.

Oxide Department.—The cinder from the roasting furnaces, which has previously been referred to, is hauled in dump carts to the oxide works, where it is mixed with any carbonate ore which is on hand. The carbonate ore is crushed by a Lanyon breaker, which consists of one stationary and two moving jaws worked by toggles, on the principle of the Blake breaker, so that one is open while the other is closed. From this breaker the ore passes to a set of 24-in. rolls, after which it is elevated to a 5-mesh trommel. The oversize goes back to the rolls, while the undersize goes to a mixing machine where the ore, together with the roasted sulphide, is mixed with an equal weight of coal.

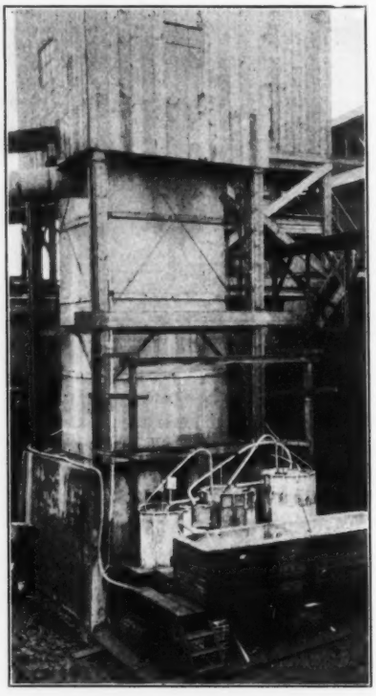
The ore is drawn off from the hopper at the base of the mixing machine and taken in wheelbarrows to the oxide burners. These are double Wetherill furnaces, and are 36 in number. They have a sealed ash-pit and the old form of Wetherill grate, with conical holes. The holes are about 1 in. in diameter at the bottom and ¼ in. at the top. The grates are 6 ft. wide and 10 ft. long. These are arched over and divided by a cross-wall in the middle. A charge consists of 1200 lb. of calcined ore, and about 1200 lb. of coal, which makes a bed 7 to 8 in. thick. A blast of air at a pressure of about 2 oz. is turned on under the grate bars and the charge is burned until no more fumes of oxide rise. This takes from five to seven hours depending upon the ore. The bed has to be raked from time to time during the burning so that this will proceed uniformly. The oxide fumes are drawn into the main flue and then pass to brick settling chambers.

In the settling chambers, the heavier fumes are settled, but the lighter ones stay in suspension and are drawn off through an iron pipe 5 ft. in diameter and about 400 ft. in length. This cools the gas and fumes before they are taken to the bag house. The burning of the ore and the passage of the fumes through the dust

CALCINING FURNACE, END VIEW.



CALCINING FURNACE, SIDE VIEW.



ACID PURIFICATION TOWER.

chambers is regulated by the speed of the fans. A cone drive made by the Reeves Pulley Company, of Columbus, O., renders the regulation of this speed quite easy. The fumes are forced by the fans to the bag house which consists of nine runs of 80 bags each. The bags are 27 ft. high, and 70 in. in circumference, and are made of ordinary muslin. Dampers are placed so as to shut off any of the runs for cleaning. This is done by beating the sides of the bags with sticks. Three stagings are carried along between the bags for the men to pass along while beating the bags. The dust falls to the bottom of the bag into a sheet-iron neck from which is suspended a sack to catch the dust. These sacks are changed each day and taken to the packing house where they are emptied into the hopper of an ordinary flour-packing machine, which packs the oxide into barrels (sugar barrel size) for the market. This oxide which is made for the paint trade is divided into four grades according to its weight and quantity. There are two grades of 300 lb. to a barrel, a medium grade weighing 350 lb. per barrel and a heavy grade weighing 400 lb. This difference of grade is due mainly to the amount of lead in the zinc oxide.

Gold Mining Industry of Australasia.

BY F. S. MANCE.

The following comparative statement shows the gold yield of Australasia for the first half of the years 1905 and 1906, in fine ounces:

	1905.	1906.	Changes.
Western Australia. ..	965,374	904,864	D. 60,510
Eastern states			
Victoria.....	338,756	381 681	I. 42,925
Queensland.....	290,478	251,978	D. 38,500
New South Wales. ..	111.868	133,149	I. 21,281
Tasmania.....	33 867	39,167	I. 5,300
South Australia.....	15,000	12 000	D. 3,000
Commonwealth..	1,755,343	1,722,839	D. 32,504
New Zealand.....	238,064	252,002	I. 13,938
Total for Australasia.	1,993,407	1,974,841	D. 18,566

The yield for the first half of this year thus falls short of that of the same period in 1905 by some 18,500 oz., and when it is considered that the production for the year 1905 was in turn much below that of 1904 it is apparent that the gold-mining industry generally is not maintaining the gratifying position it reached in preceding years. It will be noticed that while West Australia contributes a great proportion of the output, it is also responsible for the largest deficiency. Each month continues to exhibit a decrease in the production, and this is naturally the occasion of much concern. Some satisfaction is, however, afforded by the encouraging results which have followed recent operations on the Kalgoorlie field, and although the location of rich ore, similar to that which has given such handsome returns in the upper levels, cannot be expected, still the indications seem to warrant the assumption that the fresh bodies of ore recently located in the lower levels will yield payable returns, and give stimulus to further operations.

Among the eastern States, Victoria shows in a very favorable light, the increase on the production being nearly 43,000 oz. To this result the Bendigo field has largely contributed, and the returns for the half-year make a pleasant showing. The actual yield for this period was 117,320 oz., and dividends valued at £137,000 were distributed. The principal producer was the New Argus, which crushed 5438 tons for a yield of 8856 oz., and declared dividends equal to 17s. a share, and totaling £25.500. Other prominent dividend payers are the South New Moon with £21,400; New Moon, £16,800; United Ulster, £12,800; New Red White and Blue, £12,375; and Virginia, £10,800. As an evidence that prospecting work is not being neglected, and also as showing the confidence exhibited by investors, it may be said that the calls paid during the half-year totaled £95,000. The sinking of the shaft in the Victoria Quartz mine has reached the depth of 4300 ft., and the New Chum Railway shaft is well on the way to attaining the same depth. The Inspector of Mines recently visited the Victoria Quartz mine and found that the temperature at a depth of 4290 ft. below the surface was 86 deg. and that the water running out of the rocks registered 114 degrees.

In Queensland the decline in the returns, which has been a noticeable feature for some time past, still continues and the half-year closed with a further deficit of 38,500 oz. fine. The depression existing on the principal field, Charters Towers, is evidenced by the fact that the dividends for the half-year ended June, 1906, totaled only £81,650 as against £105,946 for the same period in 1905. The chief dividend payers on this field during the half-year were Mills Day Dawn United which distributed £30,000, Brilliant Extended £12,500, and Day Dawn Block £12,460. The returns from the Gympie and Croydon fields are also disappointing. During the past year the Mount Morgan company won 114,521 oz. of gold from 280,718 tons of ore. This company has now actively entered on the treatment of the large bodies of auriferous copper ore, and consequently, although a much more valuable output is expected, the actual yield of gold will be less. The directors point out, in this connection, that only a limited quantity of better-grade oxidized ore is now available, and a further reduction in the gold yield may therefore be looked for.

The industry in New South Wales gives undoubted proof of progression, and the half-year's operations show an increase of 21,281 oz. fine. The established mines are yielding well, and the numerous gold dredging plants which have been installed throughout the State contribute in the aggregate very satisfactory yields.

In Tasmania the returns, though small, are on the up grade. The yield is largely furnished by the Tasmania mine, Beaconsfield. This company has had an unfortunate experience, as, just as it was on the eve of reaping the benefit of the enormous expenditure incurred in sinking the shaft to a depth of 1000 ft., and installing powerful pumping machinery and plant, the lower workings were inundated owing to the heavy floods which broke Blythe's creek. The mine is being rapidly unwatered, the pumps delivering some five million gallons of water per diem.

In South Australia the industry shows no expansion, and is in a languishing condition.

New Zealand has still further improved its position as a gold producer, and the half-year closed with an increase of nearly 14,000 oz. The production for 1906 promises to be the best since the year 1871.

It is gratifying to be able to say that notwithstanding the falling off in the gold yield, the mining industry in Australia was never in a more flourishing condition than at the present time, and any shortage occasioned by the lessened production of gold has been more than made up by the augmented output of other metals and minerals.

Mining Notes From Sudbury.

The Mond Nickel Company, at Victoria mine, is diverting the waterway at the smelter and cutting a channel through the rock there so that the water-bed will be removed from the Canadian Pacific Railway track. This company declared a dividend of 18 per cent. on the last year's operation.

In the township of Aweres, situated about 11 miles north of Sault Ste. Marie, another strike of bornite is reported and the shaft has been sunk to a depth of 30 ft. The ore also carries copper averaging 3 per cent.

The Crean Hill nickel-copper mine, owned by the Canadian Copper Company, of Copper Cliff, is now being operated and ore is being daily hauled over the company's new track to Victoria mine, thence to the company's smelter at Copper Cliff, over the Canadian Pacific.

Buildings and development work are being prosecuted vigorously at Moose Mountain iron mine, in the township of Hutton, under the personal supervision of Mr. Lietch. McKenzie & Mann, of the Canadian Northern Railway, were visitors to Sudbury last week in connection with the road to the Moose Mountain mine and a line for the entry of the road into Sudbury.

The Manitoulin & North Shore Railway Company has commenced operations on the extension of the present line from Gertrude mine westerly to Victoria mine, with the intention of continuing same as far as Little Current in the Georgian bay.

Placer Mining in Colombia.

BY F. F. SHARPLESS.*

According to the best statistics obtainable, the total production of gold in Colombia has been to date about $895,735,000.[1] At present the production is relatively small. The country has lost its prestige, not so much by its diminished output as from the increased production of other countries. Quoting from P. N. Ospina[2]: "90 per cent. of the actual production of the country comes from the department of Antioquia, the most central of the nine departments of the Republic." I do not believe that this is strictly correct, as the departments of the Cauca and Tolima contain important gold-producing areas. The localities in these two departments that are now producing appreciable quantities of gold lie close to the borders of Antioquia; much of the metal goes to and is exported from the latter department, so it would be more proper to say that "90 per cent. of the production of the country comes from Antioquia and points in the Cauca and Tolima lying just outside the borders of the former department." Understanding from various sources that this was the case, I spent a year in this department, inspecting the old and new mines, methods and cost of operating, transportation and the many factors connected with mining operations.

Gold mining in Antioquia and its immediate vicinity may be divided into the two classes, viz., placer and vein mining. Only the former is treated in this first article, the subject of quartz mining being reserved for a subsequent article. All of the larger rivers touching or passing through Antioquia, the Magdalena, Cauca and Nechi, and many of the smaller creeks and rivers have been or are gold bearing. No statistics are available as to the amount or percentage of the gold that has come from the placers, but the available evidence suggests that previous to the present century nearly all of the production was from river bottoms, *playas* (river flats, or flood-plain gravels), *aventaderos* (bench deposits), and old river channels. The various quartz veins scattered through the department show little evidence of having been worked before the present century. Few arrastras or hand mills are found, as in Central America and Mexico, but there are many evidences of early placer mining.

Naturally the surface shows little evidence of work, virgin and worked-out ground having much the same appearance, especially along the *playas*. But it is not infrequently the case that in working extensive areas the most promising points, those expected to give a good yield, will be found to have a clean bed rock, with here and there diminutive timbers that have been used by some early miner. No iron tools or iron rust have been found. It is only the absence of gold and the timbers, placed at regular intervals, that tell of the industry of an earlier race.

I examined one placer property on the Porce River, working a *playa* by elevators and giants, where a number of large boulders were found in the old river channel; boulders that weighed from one to 20 tons. Under and around each boulder many short timbers were found, but scarcely a color of gold. While between the boulders, which were scattered at intervals of 10, 20 or 30 ft., the bed rock had apparently not been touched and gave a fairly good return. What kind of a divining rod the Indians used was not discovered, but it was remarkable now they had apparently located and cleaned out every pocket on the *playa*.

That some ancient race or races appreciated the value of gold is evident from the gold ornaments found in their graves and scattered on the sites of ancient villages. American and British museums are fairly rich in objects of art in gold taken from ancient Antioquian graves.

Many hundreds of ounces of gold have been taken from old village sites and graves during the last century, much of which has gone direct to the assay office or mint.

When the site of an ancient village is discovered the owner of the land will sample it much as we do a placer prospect at the present day. If the town lots and streets pan sufficiently well in lost trinkets or gold dust that has been dropped

A MOUNTAIN TRAIL.

A COLOMBIAN ROAD.

*Consulting mining engineer, 52 Broadway, New York City.

[1] J. P. Hutchins, ENG. AND MIN. JOURNAL.

[2] The Mineral Industry, Vol. X, p. 311.

by the jewelers, a ditch is dug to the nearest water supply and ground sluicing is started. This procedure has proved to be very profitable in a number of cases, and to a Colombian it is a particularly attractive form of mining. So far as I have been able to learn, all of the unwrought gold that has been recovered appears to have come from placers. There is no evidence, in any of these ancient sources, of gold that has been taken from quartz.

Colombian history tells us that the Spaniards took immense quantities of gold from the country. There is indisputable evidence that much gold was exported during the 16th, 17th and 18th centuries; according to Vicente Restrepo, the amount was over 20,000,000 oz., of which probably five-sixths, or more, came from placer working. History also tells us that the Spaniards found in Colombia a race of people who knew the value of gold, which they used as ornaments, and in religious rites; and these ornaments, idols, etc., were taken at every opportunity by the Spaniards as a legitimate tax on the people. It is said that this practice became so common that the churches were forced to bury their gold. However this may be, it is certain that the Spaniards secured gold both in wrought form and in unwrought placer dust. They compelled the native Indians to work placers for them and brought in thousands of negro slaves to work in the mines. There are a few records telling of localities worked by slaves under Spanish supervision; for the most part the only evidence of former work is the barren bed rock at many of the most promising points along the rivers.

Since the revolution, the native Colombians and a few foreigners have carried on mining operations, which (to judge by the production) have been quite as extensive as during the former régime. As one rides over the country he sees at many points along the river piles of tailings, occasionally a bend where the river has been diverted from its channel, and at one or two places cuts into high gravel of ancient river channels. All of this work is, I believe, modern, or has been executed at least within the past century.

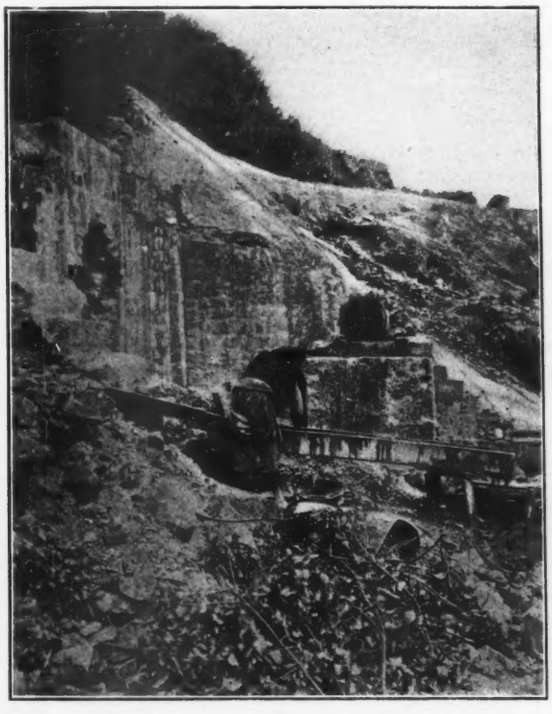
At the present time placer mining is being carried on by several native and foreign companies and by several thousand individual operators. The company work is by ground sluicing, drifting and hydraulicking. At several points hydraulic elevators are at work. One dredge has been brought into the country, but so far as I know, no dredging is now going on within the department of Antioquia.

Recent operations by foreign companies have not been attended by the success that the history of the country and the character of the ground promised. For the most part, this has been due, as I have previously pointed out,[1] to the failure on the part of the management to obtain an intelligent grasp on the situation; to recognize in time the peculiarities of the country in which operations were being conducted. In other words, due to mismanagement more than to lack of gold in the country, and I am sure that the department does not deserve the bad name that has been given it by a number of unsuccessful operations.

Mismanagement has followed operations from their inception. Fabulous reports of the richness of the gravels have been brought to the States by men having no knowledge of the material about which they have talked. Companies with a small amount of capital have been formed to work these supposedly rich deposits, superintendents have been sent down to inaugurate the work who knew little about placer mining and absolutely nothing of the country in which they were to work. Starting with poorly selected ground, and working with inexperienced men in a country of new conditions, it is surprising that failures have not been more prompt than has usually been the case. It is the native company, understanding fully the conditions under which it has to operate, though knowing little of modern placer mining, which produces gold at a profit, and sometimes at a very handsome profit.

When the native of small capital, working as an individual or company, undertakes placer mining, he generally invests but a small amount of money. If his dirt does not pay by the method of procedure adopted, he moves on to another point with little loss of money and no loss of courage, finding now and again

A COLOMBIAN RAILWAY.



WOMAN WASHING GOLD.

[1] ENG. AND MIN. JOURNAL, Vol. 79, p. 994.

points that do pay him well. Many properties owned by natives are worked on shares with the laborers, the latter paying the owners from 20 to 75 per cent. of the gold recovered, depending upon the quality of the gravel, the difficulties encountered in getting it out and the honesty of the laborer.

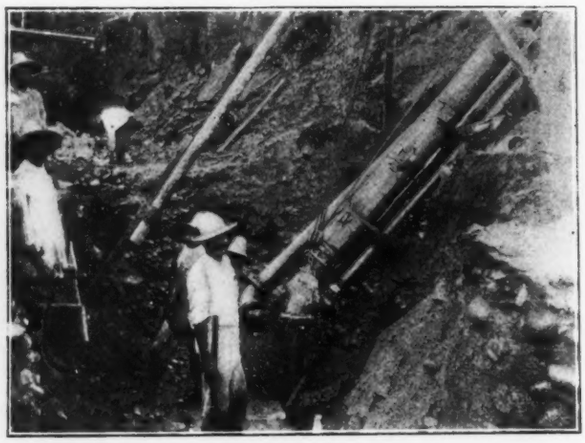
I would not have it understood that every foreign company has failed and every native company succeeded, but only that this has often been the case. But more successful than any of the company work is that of the thousands of individual miners, men, boys and women, washing on their own account, or in small parties, in every part of the State and during every dry season. It is these small producers, bringing in from a few grains to a few ounces, that are the real producers of Antioquia placer gold.

Answering the question as to what part of the country offers the best opportunity for foreign capital properly managed, I would say that there are many sections of the department worthy of careful investigation, sections that give promise of very good returns. These are scattered from the extreme north to the extreme south, and from the Magdalena river on the east to the Cauca river on the west. There are many of the smaller streams that contain little or no gravel of value, but the majority of the rivers and larger streams pass through formations that when decomposed yield enough gold to produce valuable placers in the valleys.

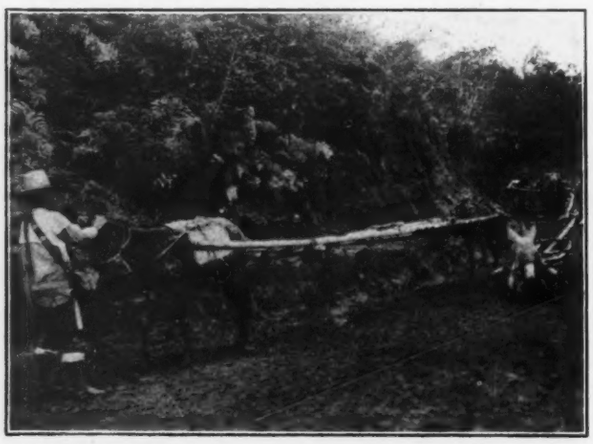
Along the Magdalena, Cauca and Nechi rivers there are many bars known to contain gold. Bars on the Cauca and Nechi are being worked now and have been worked for years. Just what they contain can only be told by a careful examination, but so much gold is coming from them, so much has come from them in the past, and there appears to be so much virgin ground that many of them merit close examination. While there is plenty of water along the lower rivers, but little of it is at such elevation that it can be used for hydraulic purposes. A great portion of the gravels lie so low that they cannot be sluiced without elevating them, and the banks, standing but at slight elevation above the river, must be handled in large volume to be of commercial value. Several pumping plants have been installed to furnish water at these banks under some pressure, but have not been successful. The quantity of the gravel washed and its gold contents have been too small to meet the expenses of this system. There are some points even on the lower rivers, where, by the use of long ditches and pipe lines, water under pressure may be brought to the bars. But the most logical way of attacking these deposits is by means of the dredge or steam shovel. The deposits are of character and position suitable for dredging or shoveling, and many of them will be found to contain sufficient gold to yield a large profit.

The greatest difficulties to be encountered when working the lower rivers are the distance from supplies and the bad climate in which the dredges must be operated. Lack of supplies may, to a certain extent, be guarded against by providing sufficient duplication of parts, or by installing a sufficient number of dredges to warrant the construction of shops in the country. The effects of the bad climate may be mitigated, but they cannot be entirely avoided. Incessant care on the part of the individual as to what he eats and drinks is absolutely nec-

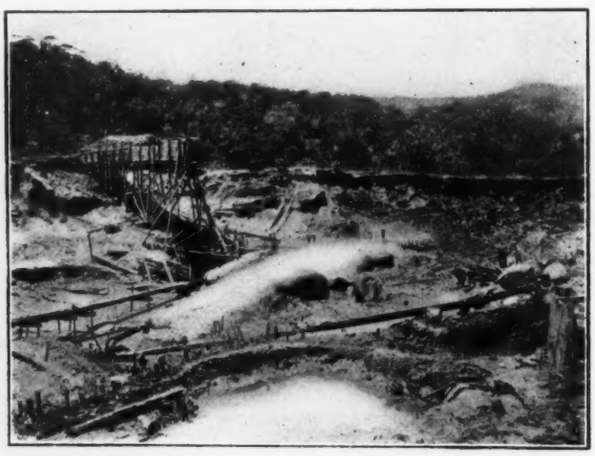
PACK TRAINS.



HYDRAULICKING ON THE PORCE.



A METHOD OF TRANSPORTATION.



A PLACER MINE ON THE PORCE.

essary. Much of the food must be imported, as well as the cooks to prepare it, and, even with the utmost care, good physicians and a hospital must be considered parts of any scheme for dredging on the lower rivers.

Coming higher up the main rivers, or entering their tributaries, a somewhat different condition of affairs will be found. The rivers become narrow and swift, the *playas* are smaller, and water with considerable head becomes available for operations. Boulders and large stones on bed rocks will in most places preclude the use of dredges. Hydraulic elevators become possible and a change for the better in climatic conditions is noted. In the higher country foreigners and natives are both less subject to malaria, beriberi, dysentery and other tropical infirmities, but this is not universally true and we cannot say that above a certain elevation no malaria is found or above another certain elevation no beri-beri is noticed, for there are points at considerable elevation where all tropical complaints may be encountered. For example, at Barbosa on the Porce River, at an elevation of about 4000 ft., placer operations have been conducted for years, the country is well drained, the vegetation is not excessive, yet nearly all foreigners who have located there have suffered from malaria, while at short distance up and down the river, the altitude changing but slightly, malaria is very uncommon.

On the higher rivers and among the hills, there remain several points where the rivers or streams might be diverted to lay bare the bottoms and several of these I believe to be in perfectly healthy localities. Still higher up on the hills are found the remains of old river channels. Several of these have been drifted to advantage, but in no case has extensive hydraulic work been done, mainly because the deposits are higher than any available water supply. Several of the old river channels have been recently examined by foreigners. They were found to be satisfactory as to gold contents, but were not taken up because of failure to find water for their operation. The country has not been thoroughly explored for old channels and it may be that there are some so located that they can be hydraulicked to advantage.

Rhodium is a white, brittle metal having an atomic weight of 103, and a density of from 12.10 to 12.26. It is not attacked by any single acid, and its fusion point lies between those of platinum and iridium. The principal use of rhodium is in the thermo-electric pyrometer. One of the wires of this instrument consists of an alloy of 90 per cent. platinum and 10 per cent. rhodium.

The June gold yield of Western Australia was 143,259 fine oz., and the total for the half-year was 904,861 fine oz.

The Burro Mountain Copper District.

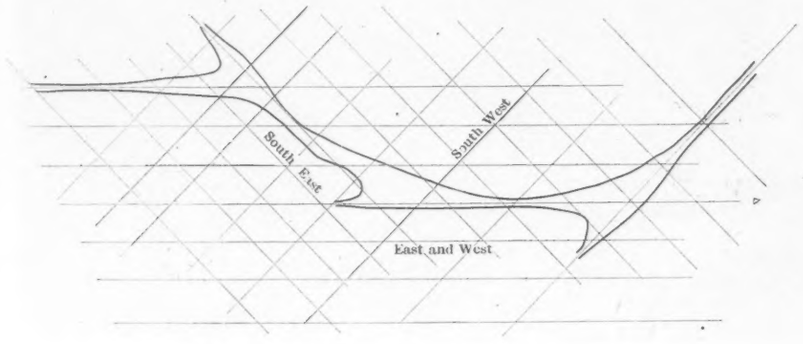
BY S. S. LANG.*

The Burro Mountain copper district is in Grant county, N. M., 15 miles south of Silver City, at the base of the Burro mountains. Mining has been carried on in the district in a desultory manner for many years, but not until early in 1904 when the Burro Mountain Copper Company and the Comanche Mining and Smelting Company began operations was much done in a systematic manner. The Burro Mountain Copper Company has opened its property by three shafts, two vertical and one inclined. The Comanche Mining and Smelting Company is sinking three shafts. The Burro Mountain Copper Company has a 250-ton concentrator working to its full capacity, and the Comanche company is building a large concentrator at Silver City and a railroad out to the district. Some of the smaller mining companies are the Alesandro, Copper Gulf and Chatham.

The principal ore mined is chalcocite and cupriferous pyrite, carrying no gold and only slight value in silver, which requires concentrating before it can be smelted or shipped. Carbonate ores are mined on a small scale, but they will never amount to much, as their vertical extension is slight. The sulphide ore averages about 3.5 to 4 per cent. copper.

The chalcocite and cupriferous pyrite occur in veins of highly kaolinized porphyry (altered monzonite and quartz-porphyry) which has a mineralized extension east and west of about three miles and two miles north and south, although a great deal of the surrounding country carries indications of copper and several small workable deposits. The porphyry intrusion is completely surrounded by granite and coarse-grain porphyry. There are no sedimentaries in the district proper except a sort of brecciated conglomerate occurring in small reefs along the top of the hills and at an angle to the present system of hills and arroyos. These reefs of conglomerate are possibly the remaining beds of old arroyos; in one case that came to my notice one of these beds carried enough malachite to form a small workable deposit. The nearest sedimentaries are five miles north, across the Mangas valley, and consist of quartzites, slate, shales and limestones.

Owing to the oxidation of the pyrite in the porphyry, the latter has a red-brown appearance. The outcrops are sometimes marked by a capping of hematite, but more often by highly silicious porphyry containing large cavities where the kaolin nodules have been removed by weathering. Most of the outcrops show but slight indications of copper mineral, although there is a series of veins, carrying chrysocolla and manganese minerals, which have good showing on surface; this is because the silicate is not as readily carried off by the surface waters as the carbonates. The veins occur with a general similarity of strike, the common line of strike being east and west, but there are two other series, southeast and southwest. There are also a number of veins which do not conform with any of these. Veins occur with practically no similarity of dip. In several of the veins I noticed the dip vary from 15 to 50 deg., varying both along the line of strike and also with depth.



SKETCH SHOWING RELATION OF FISSURES AND ORE BODIES.

The Sampson mine of the Burro Mountain Copper Company is opened on a series of east and west fissures, intersected by other two series striking southwest and southeast. At the intersection of these fissures large orebodies form, some of them being over 300 ft. long and 80 ft. wide, having a lenticular shape. However, these cross-fissures do not account for the enlargement of the vein in all cases.

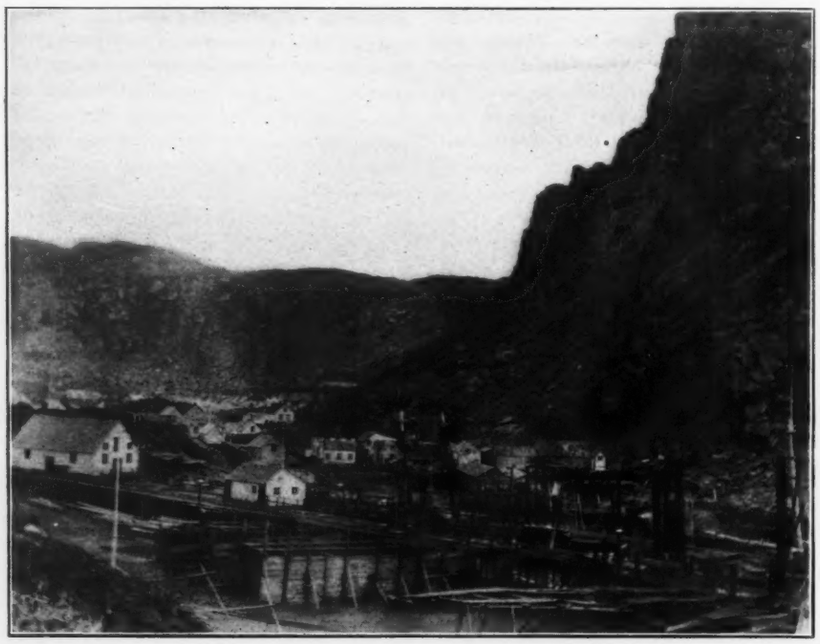
As the bodies become smaller in size percentage of copper decreases, while the pyrites increases. This occurs laterally and vertically. The decrease of the copper or increase of iron is not excessive, but in the narrow parts of the veins a fairly good grade of milling ore is obtained, and in a short distance generally widens out into another body. The gangue of the veins is white, kaolinized and silicified porphyry, generally quite soft, but when the silicification becomes marked the gangue is hard and of a gray color. When exposed on the dumps for a short time the gangue becomes yellow.

*Mining engineer, Houghton, Mich.

then brown, due to the oxidization of the iron, and as it loses its water, hardens perceptibly. The same thing is noticed in the rock approaching the surface; the gangue becomes brown, quite hard, and shows on surface in the silicious outcrop previously mentioned.

Along the walls of the large orebodies from the vein. The extent of these stock-works depends upon the grade of ore that can be concentrated at a profit. A vein will not have this form of a deposit under its whole length, and they can be shown up only by winzes or cross-cuts through the foot-wall.

The oxidized or leached zone has a



WHARF AND STOCK BINS AT TILT COVE.

are dark leathery flucans of kaolin, the color due to iron and chalcocite. Where the copper increases in the orebody this streak changes to a seam of chalcocite and through the body of the ore are lenses of the same mineral, sometimes 18 in. in thickness, which appear on the face of the stopes as a black ribbon surrounded by myriads of small chalcocite grains, which lends to the gangue a dark gray appearance. The ore accompanying these small lenses is very rich and does not require concentrating. Accompanying these rich streaks are barren veins of kaolin and nodules of the same mineral; these veins are a few inches in width, but at times obtain a thickness of three or four feet. Above and below these rich lenses and veins of kaolin the gangue becomes silicious, the chalcocite being found in films and scales in the crevices instead of being peppered throughout the gangue. The hanging wall is always well defined, but the foot at places is not so readily noticed.

Another form of occurrence of the ore is in the stockworks. Under the vein at places the kaolinized porphyry becomes mineralized with disseminated particles and small stringers of chalcocite, which form a good grade of concentrating ore. Although having the vein, for a hanging wall, the stock-works have no foot-wall, the value gradually decreasing and fading out, having a shape like a bag hanging

THE VILLAGE OF TILT COVE AND THE FRESH-WATER LAKE.

depth of from a few feet to 150 ft., with a short carbonate zone. In some places the transition is directly from the leached barren zone into the chalcocite zone, no intervening carbonate zone being noticed. The change from the secondary and rich sulphide zone to the cupriferous pyrite zone is very sudden. The extent of these zones depends altogether upon the size of the vein. In a small vein the vertical extent of each zone will be shorter than in the large veins. This is shown up in the different mines opened up in the district and by cross-cuts in the same mine. Cross-cutting from an oxidized zone in one vein may run into a secondary enriched sulphide zone of another, or if it be a very small vein into the primary cupriferous pyrite zone, so that no general contour line could be drawn for each zone of the veins as a whole. The zones follow the contour of the hills to a considerable extent, but erosion has been faster than the oxidization, and where the veins cross under arroyos or valleys the sulphides come very close to surface.

The Mount Morgan Mine.

At the meeting of the Mount Morgan Gold Mining Company held at Rockhampton, Queensland, the president reported that the chief feature of the past years' business was the operation of the new copper reduction works. The works, which consist of three blast furnaces and two converters, are capable of treating 10,000 tons of ore per month. Provision has been made for additions, which are now under consideration. The first blast furnace was blown in on Jan. 20, and the converter commenced operations on April 18. Progress was at first slow, but the whole plant has given satisfaction. The production of bessermerized copper to date amounts to 484 tons, containing approximately 7085 oz. gold. Tenders were invited, with the result that a contract for the first year was made with the Delamar Copper Refining Company, of Chrome, N. J.

Copper Mining at Tilt Cove, Newfoundland.

BY W. SPENCER HUTCHINSON.*

The Tilt Cove mines are operated by the Cape Copper Company, Ltd., and produce more than half of the copper ore of Newfoundland. Their output, which is shipped to England and New York, now approaches 100,000 tons annually, and they have a production record exceeding 1,000,000 tons. This ore is pyritic and is used by the sulphuric acid makers. The average copper content is about 3.5 per cent.

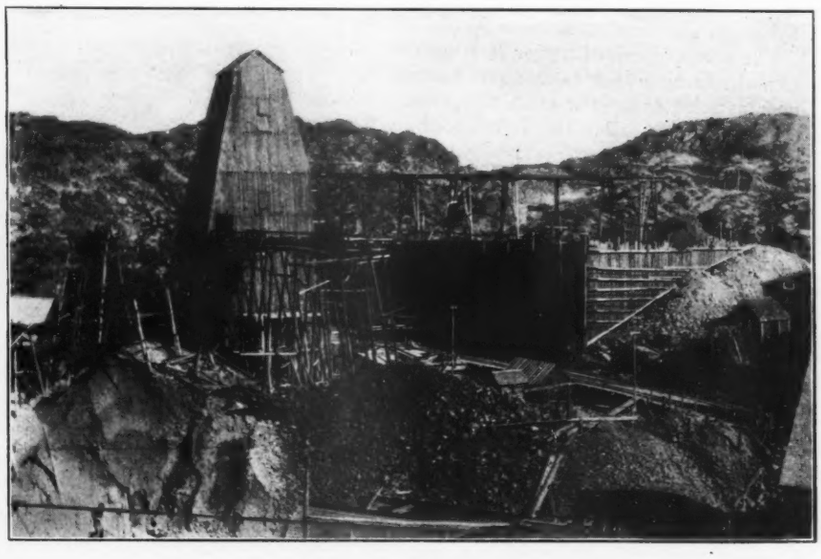
Tilt Cove is situated in Notre Dame bay on the north shore of Newfoundland. Its harbor is no more than a notch in a shore line of precipitous cliffs. Vessels can dock for loading cargo only in fair weather, but good harbors are found in the deep arms or bays a few miles down the coast. Just inside this notch, through an opening in the cliff, is a fresh-water lake surrounded by an amphitheater of hills. The little village surrounds the lake, and the narrow strip of land between the water and the rocky hills is occupied by neat little white cottages and green garden plots.

The mines have been worked more or less continuously for 35 years. The principal orebodies occur in serpentine schist and are adjacent to a strong dioritic dike. The largest mass of ore was 350 ft. by 280 ft. at the surface and 220 ft. deep. At the bottom it pinched out, the mass having had the general form of an inverted cone. This was worked formerly in a system of chambers, leaving pillars and floors. A few years ago the overburden of gravel and peat was stripped off, and they are now taking out the pillars and floors, working from the top downward in a great open pit. Another large orebody recently opened is now being mined by a system of chambers.

Economic conditions are unique; labor is cheap and fuel expensive; in consequence the mine is operated practically without machinery. The ore is hard but all drilling is by hand. The cost of mining from the big open pit is $1.21 per ton. The equipment at Tilt Cove is in marked contrast with that at the Pilley's Island mine, also in Notre Dame bay, where an American company has installed modern hoisting machinery and a fine air compressor.

*Mining engineer, Boston, Mass.

THE OPEN PIT OF THE TILT COVE MINE.



THE PILLEY'S ISLAND MINE.

Notes From Broken Hill.

The prolonged endeavors that have been made during the past few months to amalgamate the Broken Hill North Company with the Broken Hill Junction North Company have proved of no avail. At a recent meeting of the shareholders of the last named company an unfavorable vote was cast on the question. The promoters of the scheme, however, propose to renew their efforts, as they are convinced that both companies will be benefited by working the mines as one property. The promising developments in the Broken Hill Junction North mine appear to have unduly enhanced the value of the property in the shareholders' estimations.

The technical management of Block 14 mine has for some time been experimenting with fine slimers of the Sperry type, with a view of securing a more rapid and effective concentration than by the machines hitherto employed.

The British Broken Hill metallurgists have also been experimenting along the same lines with a Card concentrator. Fine grinding in pans is again claiming the attention of millmen at Broken Hill, and the new plants on the South and Central mines will be furnished with a number of large-sized grinding pans.

The Cost of Smelting Copper Ore.

G. F. BEARDSLEY.*

The following information is intended, primarily, for mining investors, mining promoters and non-technical men who may be trying to figure out the costs of ore treatment by blast-furnace methods. While there are but few cases that the figures will fit as they stand, the various items will serve to indicate the information required to make up an approximate cost of ore treatment.

Conversations held with gentlemen who come under the above classification indicate a want that these notes may possibly fill. Some were being asked to make investments in copper mines and prospects; others were trying to figure out the commercial value of mines in which they had already invested, or in which calls for plants were being made. All had the cost of ore treatment of the several enterprises in which they were interested carefully figured out, and some of them were pretty sure of their results. The data for their figures were gathered from the reports of various smelting companies (often misinterpreted), from newspaper clippings, from scrappy information obtained piecemeal from one or more practical men (some of this second hand), from budding assayers, from college men, from practical city miners and from various friends and acquaintances. In other cases, the data were supplied by parties having mining properties or interests for sale, or wanting to raise money for further prospecting, or for a plant. These data were, of course, presented as information from entirely disinterested sources; "this costs this, that costs that, and the ore goes so much; figure it out yourself."

Although there were many omissions in

*Consulting metallurgical engineer, West Somers, N. Y.

the several sets of figures shown, there was one that was common to all, viz., the cost of selling the product, the blister copper. It was the apparent lack of knowledge on this point that prompted the writing of this article.

Some had included the cost of freight from mine to market, but most of them had figured copper at the mine or works as cash. Other omissions, more or less common to all, were mine development or exploration charges, plant maintenance, delivery of ore to works, sampling, laboratory or assaying and supervision. Head office expenses, taxes and insurance, which may be classed as general expense, were never thought of. This has not been included in the estimates of this article, except in one instance, as the wide variations in this item must, naturally, be governed by special and local conditions.

The present price of copper is bringing to notice many properties that were looked upon as being of too low grade to operate but a short time back. The omission of a few small items, in conjunction with the disposal charges, knocks the gilt off of some of these, especially those a long way from the selling point.

The following three examples will give a fair idea of the relative position occupied by the item "disposal charges," together with others frequently overlooked, when compared with the whole.

The first example is from the Mt. Lyell mine, of Tasmania. The ore is an exceptionally pure iron pyrites, containing about 2.3 per cent. copper, 2 oz. silver and 0.07 oz. ($1.40) gold. The average analysis of this ore is iron, 40 per cent.; sulphur, 46; silica, 5; baryta, 2; alumina, 2. The ore is treated by a method known as pyritic smelting, in which the sulphur and iron are made to take the place of fuel almost entirely. The product of the ore smelting is "first matte" of 8 to 10 per cent. copper. This is concentrated by a second smelting to "converter matte" of 35 to 40 per cent. copper. Finally, this is blown up in converters to a metal commonly termed "blister copper," carrying about 99 per cent. copper, and nearly all the precious metals of the ore. The blister is sent by steamer via England to the United States for refining and sale.

The second example is from the work of the Tennessee Copper Company (see abstract of official report in the JOURNAL, Apr. 6, 1906). The ore is a pyrrhotite, which contains about 2½ per cent. copper, and traces of the precious metals. For the principal mine, the analysis is as follows: Iron, 38 per cent.; sulphur, 29; silica, 11; calcium oxide (lime), 5.5; alumina, 6; magnesia, 1; manganese oxide, 0.75. This ore is now treated as in the first example. The blister copper is sent to New York for refining and sale.

The third example is figured for an ore in Mexico, 50 miles from a railway; the ore to be practically the same as in the first example, in gold, silver, copper and other constituents, and the method of treatment the same.

There may be added a fourth example, viz.; the Granby mine, of British Columbia.

MOUNT LYELL, 1903.

Labor, $5.44 per 24 hours; coke, $12.50 per ton.

Cost of treatment per ton of 2000 lb.:

Mining	$0.4938	10.1%
*Removal of overburden	0.4321	8.8
*Delivery of ore to works	0.2619	5.3
*Sampling	0.0393	0.8
Smelting	2.3664	48.7
Converting	0.3442	7.0
*Supervision	0.1259	2.6
*Disposal charges	0.7993	16.4
Total	$4.8638	99.7%

Taxes, legal and administrative, are not included. The deposit, which is worked by the open cut system, dips into a hill—wherefore, the item "removal of overburden." "Smelting" includes labor, coke, fluxes, power, heating blast, stores, water supply, flue-dust briquetting, proportion of laboratory, and matte concentration. The items usually overlooked by the casual figurer are marked with an asterisk, and in this example amount to 33.9 per cent. of the whole cost. Converting is always taken as part of the smelting cost, when speaking of the cost of smelting.

TENNESSEE, 1905.

Labor, $2.60 per 24 hours; coke, $3.50 to $6 per ton.

Cost of treatment, per ton of 2000 lb.:

*Mines development	$0.1712	5.6%
Mining, hoisting, etc	0.6861	22.5
*Crushing and sorting	0.1060	3.5
*Railway, delivery at works	0.1279	4.2
Smelting	1.2450	40.9
Converting	0.2313	7.6
*Engineering and laboratory	0.0534	1.7
*Freight, insurance and selling expenses	0.2366	7.8
*Taxes and general expenses	0.1809	5.9
Total	$3.0384	99.7%

The item "smelting" in this, as in the first case, comprehends everything from ore in the smelter bins to matte in the converter. The items usually overlooked would be, in this case, 28.7 per cent. of the whole.

MEXICO, 1906.

Labor, $1.50; gold, per 24 hours; coke, $30, gold, per ton.

Cost of treatment, per ton of 2000 lb.:

*Mine development	$0.40	8.6%
*Mining	1.00	21.4
*Delivery to works	0.10	2.1
Smelting	2.03	43.5
*Converting	0.14	3.0
*Engineering and laboratory	0.10	2.1
Freight and disposal charges	0.89	19.1
Total	$4.66	99.8%

Freight on blister to New York, $30, gold, per ton. The items usually omitted amount to 34.9 per cent.

GRANBY.

The published reports of this mine are not in detail, but from the 1905 report the disposal costs may be calculated. The weights of the copper, silver and gold are given, and the average sale price; also the total net amount realized ("freight to New York, refinery and all other charges deducted from gross receipts"). This gives a disposal cost of $276,758 on 7118.8 tons of copper or 9.1 per cent. of the total value of the product. On the copper value only, the disposal costs are 13.5 per cent.

The mining and treatment cost per ton of ore smelted was $3.046. This and the Tennessee work is probably the cheapest done in the world, and represents, in a manner, the two extremes of copper smelting practice. At Tennessee, the object of the smelting is to burn up as much iron and sulphur as possible, for the purpose of concentrating the valuable metals of the ore in the matte, while at Granby, the ore contains scarcely sulphur and iron sufficient to form a slag and provide the necessary matte vehicle for the separation of the copper.

It will be noted that in the first three examples the disposal charges amount to 16.4 per cent., 7.8 per cent., and 19.1 per cent., respectively. As the refinery charges are nearly constant, the ratio between them is, roughly, in proportion to the amount that has to be paid for freight on the blister copper from the works to the refinery or market. It may also be noted, that the sum of the items usually omitted from the calculations of non-professional men is about one-third of the true cost.

To get an approximation of the whole cost of treatment of an ore, ascertain with a reasonable degree of accuracy the cost of as many of the items as possible. Add together the percentages against the similar items of the examples, and make this sum up to 100. This will be the total approximate cost. Roughly, mining and smelting costs vary in proportion to the cost of ordinary labor; and the establishment of the correct cost of a few items will give a fair approximation of the whole. The reason for this is, that, with the exception of coke, coal and stores, the mine and smelter consumes practically no raw material costing cash; and only material costing labor.

Queensland Mines.

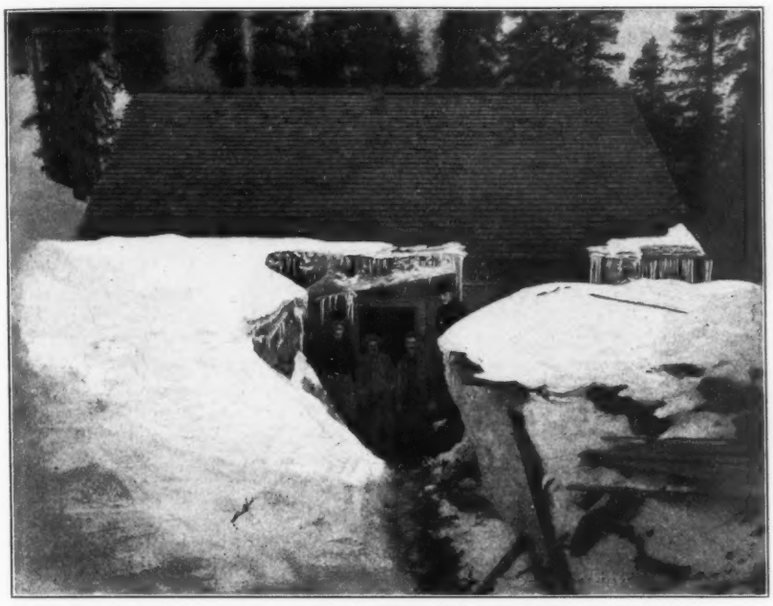
The Herberton Monazite mine, situated 7 miles north of Hot Springs, is being actively developed. In this property, there is a wide orebody carrying tin, wolfram, cobalt, nickel and copper. The ore is too complex for local treatment, and is bagged and shipped to Germany. Both tin and wolfram mining operations are being actively carried on in this district, and the output of both metals during the present year promises to make a record.

The Dalziel tin mine, owned by an English company, is developing a large tin deposit by means of a tunnel, which is now 220 ft. in length.

Anthracite Coal Mining in Colorado.

BY R. M. HOSEA.*

The anthracite coal industry of Colorado is a small factor in the yearly amount of coal produced. At the present time there is only one producing mine, viz., at Floresta (or Ruby, as it was formerly called), although the old Smith mine at Anthracite, above Crested Butte on the Slate river, was formerly a large producer. Exploration has shown the probable existence of another workable vein at the latter point some distance below the old one, and operations are now going on which may result in the resurrection of this, the oldest and for a time the only anthracite mine and breaker west of Pennsylvania.



OFFICE AT RUBY IN MAY.

Another mine and breaker near Cerrillos, N. M., has been for some years a small producer, but is not now being operated.

Outside of these there are no producing mines in the Rocky Mountain region, or indeed west of Pennsylvania. There are not likely to be many, for the fields are of very limited extent, estimated in Colorado to be less than 10 square miles all told, and situated in inaccessible places, where the cost of production is so great that the market is quite limited. The cost of production of anthracite is much higher than that of bituminous coal, by reason not only of the inaccessibility of the deposits, but for the additional reasons that all the ordinary expenses of mining underground are at least as great as those of any other mine, the coal is very hard and requires more powder to shoot it down than soft coal, and the seams are often traversed by dikes and lava intrusions, thus increasing the cost of dead work and the difficulty of mining.

In addition to these reasons, in order to make anthracite coal available in the market for domestic or even for steam purposes, it must be broken up by toothed crushers, sized into various sizes for different purposes, and the slate and impurities picked out, largely by machinery, but partly by hand. This necessarily makes anthracite coal a luxury in Colorado, and the principal demand comes from users of household furnaces and stoves.

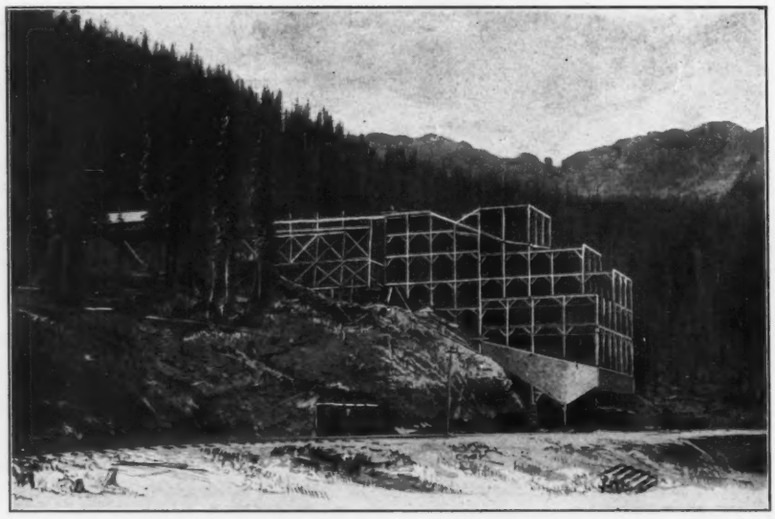
The preparation of the coal makes a large amount of the smaller sizes, and these have to be disposed of for the best prices that can be obtained—which means that the culm, buckwheat and small coal must be thrown away. This amounts to a large percentage of the amount mined, and probably not over 50 per cent. of the coal produced is sold, the balance being an expense to the breaker by reason of the cost of its disposal into the "culm" piles surrounding these mines. In Colorado the sizes produced and marketed are Nos. 1, 2, 3, 5 and 6, corresponding to "broken," "egg," "stove," "chestnut" and 'pea" of Pennsylvania. Nos. 1 and 2 are usually sold for furnaces, grates or large stoves; Nos. 3 and 5 for ordinary base-burner stoves, railroad-car heaters, Pullman cars, etc., while No. 6 is usually taken by steam users when the price allows it to compete with soft coal, or when a smokeless coal is desired.

To avoid the production of culm and small coal at the breaker as much as pos-

TRAMWAY AND BREAKER AT ANTHRACITE.

*Chief engineer, Colorado Fuel and Iron Company, Denver, Colorado.

sible, it is customary in Colorado to load the cars in the mine workings with forks having tines ¾ in. apart, and sometimes 1 in. apart. This, of course, leaves much good coal in the rooms to be wasted, but there does not seem to be any help for it. In Pennsylvania, where the production is large and the anthracite supply predominates, the smaller sizes find a ready market, particularly in the large Eastern cities, on account of the cleanliness and freedom from smoke and soot. Even the buckwheat is utilized under boilers by using a strong air blast in specially constructed furnaces. It is probable that many families in the Eastern States scarcely knew there was any other coal than anthracite until the great strike in Pennsylvania, which brought so much soft coal into the market and made the Eastern citites as smoky as Pittsburg for a time.



RUBY BREAKER UNDER CONSTRUCTION.

In anthracite breakers great hight is necessary, in order that the coal, without re-elevating, may be crushed and sized, the slate and impurities picked out, and the different sizes distributed into large storage bins ready for loading into cars for shipment. The process is the same, or very similar, in all anthracite breakers, and is followed out at Ruby, Anthracite and Cerrillos. At Ruby the cars from the workings ran direct from the tunnel into the breaker at its highest point in the first instance, but as the upper territory became worked out, it became necessary to hoist the coal from lower levels on a surface road, although it was expected originally to do the hoisting underground. In any case, it is necessary first to get the coal to the top of the breaker. After dumping, the coal passes over a bar screen where the rock and large impurities are picked out and thrown aside. The large, clean lumps are pushed into traps or openings, which lead to the lump crusher. The screenings fall through the bar screen or grizzly in the usual way, and pass down into mud screens. Here they are sized into the different sizes, and separated each size into its proper chute, which leads to the picking tables. This operation is substantially what is done at Ruby.

The coal which has been crushed in the lump crushers is conducted into separate screens called main screens or counters, and after sizing, goes direct to the storage bins, as it is already clean, and requires no picking over. All kinds of machines have been invented to pick the slate from sized coal, but none is entirely successful. There are machines at Ruby, where the coal slides over blades set at an angle, where the spaces between gradually enlarge, and the slate being flat, drops through, while the coal, being rounded, passes over. Unfortunately, much of the coal is flat in character, and it requires labor to re-pick the waste pile, or great loss of good coal results. Other machines feed the coal in a thin layer across wide chutes, down which it slides to a marble or stone slab. The slate is retarded and drops into an opening, while the coal has velocity sufficient to jump the opening. The opening can be made wider or narrower, and in this way a separation can be made. Even this is not altogether a success, and final reliance has to be placed on men or boys with good eyes and intelligence. In some places jigs are used with fair success, but it takes a great many to handle a large output, and they are expensive to build and operate. Besides, the coal gets wet and freezes in the cars in winter, which is an objection in a cold climate.

Some of the conducting chutes or spouts are very long, and are given many turns and runs so as to let the coal slide gently to the bins without fracturing and splintering, which would be the case if the spouts pitched more than 3 in. per foot for large, or 3½ to 4 in. for small sizes, and would undo all the care used to maintain even sizing. Every handling or dropping breaks up the coal, as it is quite brittle, and care must be used throughout, particularly in getting the coal into bins and out of them into railroad cars, to avoid undue breakage. The delivery spouts leading into bins empty upon telegraphs hung in the bins, which are movable, wide, shallow troughs down which the coal glides gently, overflowing the sides and sliding to the bottom of the pile. When bins are empty, coal might fall 20 or 30 ft. to the bottom and be badly broken up, and its sizing ruined.

At the railroad tracks where the cars are loaded, the outlet doors of the bins are provided with lip screens, where all dust, culm and small, undersized coal is screened out, and either hoisted back to the breaker for re-sizing or thrown into the waste. When a car leaves the breaker it should contain fairly even sized coal, but switching and bumping cars, the shaking of a long haul, transferring into other cars, unloading at the yard, reloading into wagons, unloading into our back yards and shoveling into coal cellars make quite a difference in the appearance of the larger sizes by the time the consumer gets the coal. Besides, he usually finds a great deal of slate, and kicks accordingly, although the larger sizes are usually quite free from it.

BREAKER AT MADRID (NEAR CERILLOS), N. M.

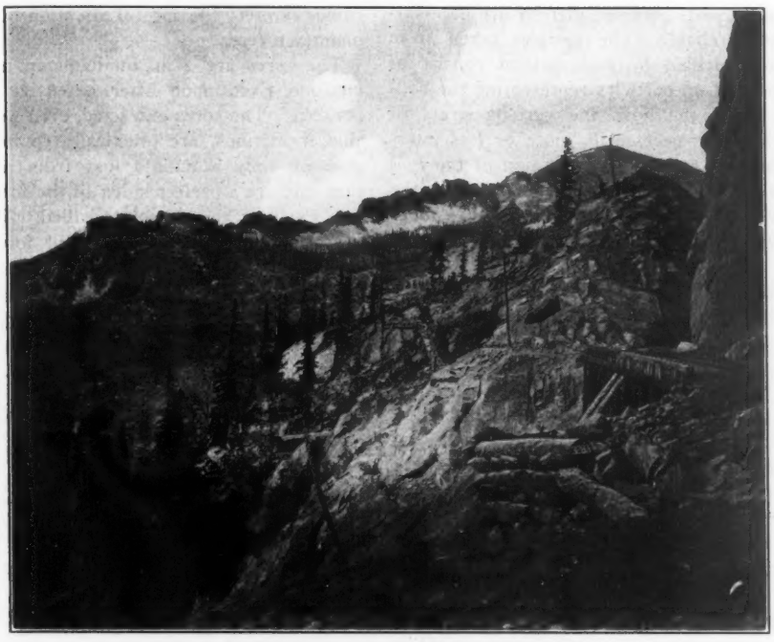
It is practically impossible to entirely remove slate from Nos. 5 and 6, as the cost of so doing would be too great.

An anthracite breaker is an expensive building and is liable to accidents of various kinds. In Pennsylvania, many are burned from being struck by lightning and some have been set fire to by English sparrows who build their nests in the inaccessible corners, where they gather paper, straw and greasy waste. It is supposed they also pick up matches, which built into the nests become ignited and start the fires. The dust and noise seem to have no terrors for them.

There are two general systems of preparation of anthracite, the wet and the dry. In the wet system water is used on the coal from the time it is first dumped, on the crushers, in the screens, and to carry the sized coal in the spouts to the jigs where the slate is taken out. This makes the coal in the bins very wet, and as it is given a final spraying upon being loaded into cars it freezes and is troublesome to handle in winter. The breaker is, however, comparatively free from dust.

In the dry system, as at Ruby, Anthracite and Cerrillos, these objections are removed, but the breaker becomes exceedingly dusty and the air is so thick with it that artificial light must be used wherever men are at work. The dust is breathed constantly by the workers and it seems impossible to entirely remove it, although many efforts have been made by suction fans and other devices to carry it away from the various places where it is formed, as at the screens and crushers. The revolving shafts, pulleys, and traveling belts, of which there are a large number, continually stir up and distribute the dust, which makes removing it a difficult problem to solve.

The Ruby breaker when built in 1893, was of modern design and compared favorably with the best in Pennsylvania. The capacity of its crushers, screens, etc., is about 1200 tons per day, but it has never yet been run to its full capacity. It was built by the Colorado Fuel & Iron Company, with its own men. The breaker at Anthracite has a capacity of about 300 tons daily and was constructed in 1881 or 1882 by parties from Pennsylvania, and that at Madrid (near Cerrillos, N. M.) by the Atchison, Topeka & Santa Fe coal department, about the same time as Ruby. It can produce about 300 tons a day. These three being the only breakers west of Pennsylvania, views are shown as a matter of historical interest.



R. R. BRANCH NEAR RUBY BREAKER. RUBY PEAK IN BACKGROUND.

The breaker at Ruby was built during the winter when the snow was 12 ft. deep on a level over that country and the difficulties of construction and the expense much increased.

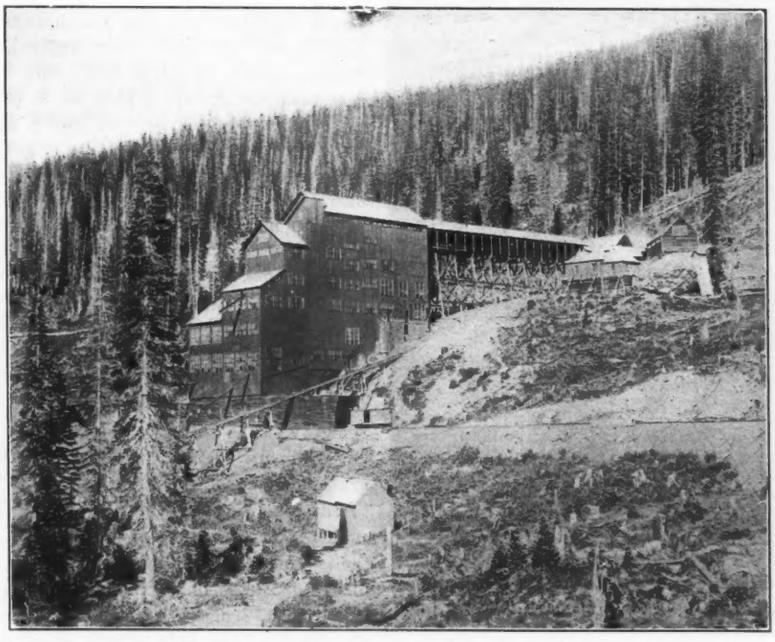
At Anthracite, Colo., the coal from the mine, instead of being hoisted into the breaker, has to be lowered to it by means of a long inclined plane, as shown in the illustration.

In this case in the winter months the men who work at the breaker live practically isolated from those who work in the mines. Owing to the deep snows, there is no means of communication from bottom to top except by means of the tramway or a long, hard climb up the track on foot. The boarding houses and other buildings are shown perched on the edge of the slope at the top.

This discussion and the views will show some reasons why anthracite coal costs more than soft coal in Colorado.

Progress in Coal Prospecting.

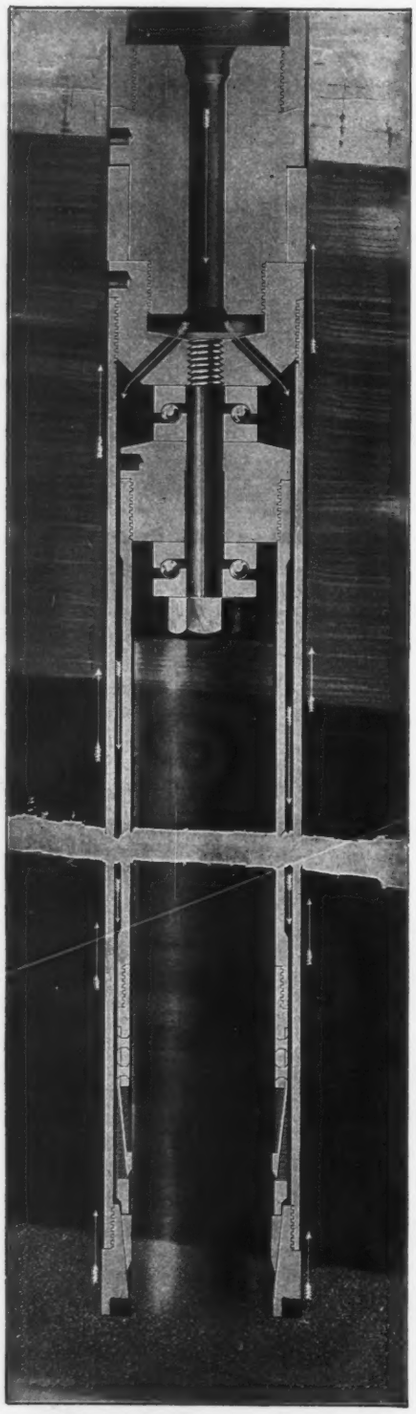
The cost of working a given coal area is determined to a large extent by the character of the formation, and is affected by every variation in the pitch of the seam and the condition of the strata immediately overlying and underlying the coal. The profits are closely dependent on the kind and character of impurities existing in the coal itself. It is, therefore, apparent that the determination of the practical value of a coal area in advance of actual mining is a matter of the greatest importance, and worthy of the use of the high-



RUBY BREAKER, SHOWING SPRUCE TIMBER FROM WHICH LUMBER FOR BREAKER WAS CUT.

est grade of appliances and engineering skill that can be brought to bear on the problem.

There are four commonly known methods of prospecting coal lands, which show the same number of successive steps in the development of the art of obtaining exact knowledge of the commercial value



DOUBLE-TUBE CORE BARREL IN OPERATION.

of a given formation. In order of general value, they are as follows:

1. Sinking of shafts, or driving of slopes on the coal vein.

2. Drilling test holes with the churn or percussive drill.

3. Drilling core holes with chilled shot or saw-toothed bits.

4. Drilling with the diamond core drill, using the double-tube core barrel.

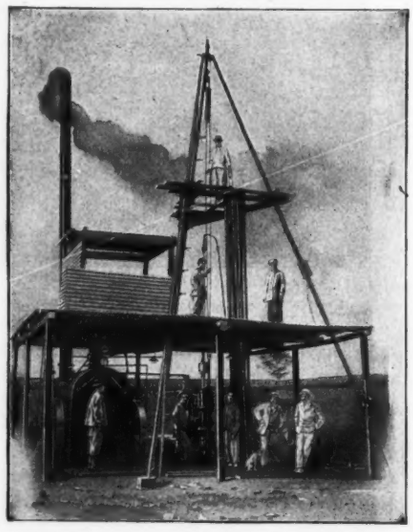
The first method, which consists in exploring the vein by shafts, or other workings, is necessarily slow and prohibitive in cost. The second is cheap and rapid, but records obtained thereby are necessarily unreliable. The samples taken from holes drilled by this method consist of chopped-up particles representing the contents of the hole, the various strata of which are necessarily more or less intermingled, so that the condition of the coal as to purity, and the character of the overlying and underlying strata, are mere guess-work.

The third method, that of drilling with chilled shot, or saw-toothed bits, is an improvement over the second, but leaves much to be desired in the matter of drilling speed and condition of the core. The apparatus does not lend itself to the use of devices by which the core is extracted carefully, and does not operate with the precision and smoothness required to prevent the core from being broken up by vibration.

The necessity for obtaining the most perfect records possible is apparent, when it is remembered that large amounts of capital must be expended in the purchase of lands, building of railroads, installation of mechanical equipment, driving workings and building of houses before a coal property can be put on a working, or dividend-paying basis.

It is a fact, accepted almost universally by mining engineers, that the highest development obtained in this art is the diamond core drill, including the double-tube core barrel. In this latter method, the drilling crown, or bit, is faced with black diamonds, or carbon. This bit is placed at the end of a tube or core barrel, which is of peculiar construction. As implied in the name already mentioned, this core barrel consists of two tubes, an inner and an outer member, the inner one being suspended on especially designated ball bearings, to make it free of the rotation of the outer tube. The outer tube is made to fill the hole closely and rotates without vibration. Between the inner and outer tubes is a space through which water is forced, which emerges under the bit, carrying away the cuttings. Close to the bit, an automatic device is placed which grasps the core when the core barrel is lifted, thus bringing it to the surface. The core barrel is connected to the drill on the surface by the required number of drill rods, made of hollow steel tubing in exact 10-ft. lengths, by means of which the depth of the hole at any given time is accurately measured. The bit, core barrel and rods are rotated by means of a suitable engine, and are fed downward by hydraulic pressure regulated by finely graduated valves. The hoisting and lowering of the rods is accomplished by means of a derrick, or tripod, carrying a sheave wheel and a rope, which is wound upon the drum forming a part of the drilling machine. The entire apparatus is designed in strict accordance with engineering principles, and every detail of materials and construction in these machines receives the careful attention of the manufacturers.

The cores are 2 in. in diameter, a dimension fixed upon after extensive experience. The cores extracted, even in friable formations, are practically complete, showing only a minute loss from abrasion, and are a perfect index of the formation existing at the point drilled. They are placed in suitable cases, and form a permanent record. Vertical sections of the core may be taken for analysis, as required, the remaining portions being preserved.



DRILL PROSPECTING FOR COAL IN CHINA.

The method described is equally applicable to prospecting for any other mineral, and is especially desirable when cores are liable to be broken or ground up by the ordinary method.

In addition to the reliability of the records which they secure, diamond drills are also much more rapid than any other coring drill, owing to the small diameter of the hole bored, and the readiness with which the diamond bit penetrates all strata encountered.

The accompanying view shows a diamond drill engaged in coal prospecting, and illustrates the outfit and equipment needed for such work. This, together with the drawing of the double-tube core barrel, was furnished by the Sullivan Machinery Company, Chicago.

At every mine it should be the practice to keep on hand a supply of interchangeable parts for all pieces of machinery, motors, etc., so there will be no costly delay in case of an accidental break-down.

Colliery Notes.

In boiler practice, to keep the heating surfaces clean, and the internal surfaces free from scale and grease, are the two most essential conditions to be fulfilled.

No miner should be allowed to drill or shoot what is known as a "dead" hole for any part of its depth; nor tamp any drill hole with drill dust or other combustible material.

Coal is found in many places in Peru, but so far a coal of high quality has not been discovered in any quantity. The production of coal in 1904 amounted to about 60,000 tons, chiefly mined in the Cerro de Pasco district.

As it is sometimes impossible to trace the history of a chain that has to be used in an emergency for an important purpose, it is wise to treat all such chains with suspicion, and to stress them by the following rule: $D =$ diameter in ⅛ths of 1 in.; $D^2 =$ safe load in cwt. This gives for ¾ in. unknown chain a working load of $6 \times 6 = 36$ cwt., or 1 ton 16 cwt.

After a trial of oil fuel lasting a year on the torpedo boat "Gwin," the officer in command of the reserve torpedo flotilla has recommended to the Navy Department that the "Gwin" be fitted to burn coal instead of petroleum. The best speed obtainable with fuel oil on the "Gwin" was about 16½ knots, while her sister boat, the "Talbot," on which coal was burned, obtained a speed of 20 knots.

The total amount of exploitable coal in New South Wales (seams less than 3 ft. being omitted, and coal at a greater depth than 4000 ft. being left out of account) is estimated to be at least one hundred thousand millions of tons. There is probably an equal amount of coal available in Queensland, making a total amount of exploitable Permo-Carboniferous coal in Eastern Australia of 200,000,000,000 tons.

The greatest care must be exercised by a miner, or anyone who travels through a mine, to see that all doors and curtains are left as they were found or as they should be. It is not unusual to see even a miner who should know the importance of not disturbing the ventilating current, hurry along pushing doors open and never waiting to see if they swing shut. Such carelessness is inexcusable and might cause the death of many workers.

A windy shot may arise from the mixing of different grades of powder in the same hole, or the firing of two or more shots in quick succession in the same working place. A blown-out shot may be due to the charge being laid too deep on the solid, or to the shot being weak at the heel; it may also result from improper stemming or tamping, or come from using too great a charge for the work to be accomplished. If the diameter of the drilled hole is too large, localizing the effect of the blast and causing too great a pressure on the tamping, a like unfavorable result may be obtained.

In many coal-mining districts there is an absolute neglect on the part of the operators to provide and maintain a suitable wash room at a convenient place near the shaft or mouth of the mine. In this wash room there should be a place arranged for miners and other employees to hang their clothes for the purpose of drying. The provision of such a wash house and locker room, on the part of the operators, is necessary for the cleanliness and comfort of the miners, and should be required by law in every State.

Although many States have enacted laws to govern the use of powder in our coal mines, still there is a remarkable lack of knowledge on the part of miners concerning the amount of explosive that is permissible for use. Where the matter has been investigated in bituminous mines, it is advised that in no case shall the quantity of powder used exceed 60 in. where the coal seam is 5½ ft. or more in thickness; and shall not exceed 48 in. in coal seams under 5½ ft. thick. For uniformity in measuring the charge it is prescribed that one inch of powder shall be one lineal inch, 1½ in. in diameter. All charges should be measured in a metallic tube, not to exceed 12 in. long and 1½ in. in diameter.

Where a mine is gassy and it is difficult to ventilate properly the advancing faces, a new scheme not generally used may be worth consideration. Take for instance the case where an entry and its air-course have advanced to the point where another crosscut is to be driven. As a rule very little air circulates at the face or in the unfinished crosscut when this stage of development is going on. If a 2-in. pipe be run from the entry face back to the last crosscut, which is partially closed, and this pipe is then carried into the air course and run along the rib to the head of the air-course, the ventilation at both faces is greatly benefited at little expense, since it is possible to have the piping in sections and to move it forward after each new crosscut is finished. An arrangement whereby a wooden box pipe is substituted for the iron pipe has been used with success.

In working steep coal seams it is claimed that working to the dip allows an easy stowing of rubbish and dirt and results in a saving of pit work. The method of sinking vertical shafts in the adjacent strata and then cross-cutting the seam is expensive because of the dead work and small area won, and can only be used to any advantage when the seam dips as much as 60 deg. Driving a slope in the seam, installing an engine and operating a plane is most favored as a method for developing a steep coal bed. One fact has been proved by experience, however, that 8 to 10 per cent. more round coal is produced by working to the dip than working to the rise, which is accounted for by the fact that the weight is thrown off the face in working to the pitch. This system, however, possesses disadvantages when water is present, and an additional one in that the gradient is always against the load.

The weakest point in electrical transmission, is the absence of proper means for storing electrical energy on a large scale at a reasonable cost. This requires that the whole plant be capable of supplying current at the greatest rate likely to be called for at any moment, and still provide an ample reserve of capacity in case of a break down in any part of the system. In this connection, the advocates of gas claim that this latter power can be readily and cheaply stored in quantity, for any desired length of time, and used at whatever moment and in any amount without deterioration or loss. The plant, if necessary, may be shut down for a time without interrupting the supply. Until recently, however, it has not been considered possible to convey gas with any success over long distances. This has been due to a lack of efficient compressors, and of pipes and joints not capable of withstanding, without excessive leakage, the pressures which would have had to be employed. With air compressors having a total efficiency as high as 77 per cent., and steel pipes capable of carrying high pressures and obtainable in longer lengths, thus reducing the number of joints, gas is becoming a power which in many cases compares favorably with electricity.

There are many advantages resulting from driving a locomotive with a single motor, especially when the work performed is underground haulage where the track is often irregular. To develop drawbar pull is the primary purpose of a locomotive, and this requires that all of the wheels revolve at the same speed. The frictional resistance between the driving wheels and the rail decreases greatly when slipping occurs. If the four wheels are geared to one armature, they are then all compelled to revolve at the same speed, and it is also made possible for the motorman to start the trip in the shortest time, since any amount of current, less than will cause slippage of all the wheels, may be quickly turned on through the rheostat. This use of a single motor also makes possible the easy adoption of double-end control, which permits the motorman always to occupy a safer position between the locomotive and the trip, and to be within easy reach of the coupling pin between the locomotive and the first car. Another feature being generally demanded by users of locomotives is that the entire machine be built so as to stand entirely within the track, permitting narrow entries, and avoiding the danger of crushing men against the rib.

Metallics.

Experiments have shown that a small percentage of hydrated lime or of slaked-lime putty will materially increase the imperviousness of concrete to water under pressure.

One great advantage of electric firing is that the miner can retire to a perfectly safe place before attempting to explode the charge. This is important in sinking shafts, where the means of escape are less easy than in levels.

Notwithstanding the commercial mishaps of the Montana Zinc Company, of Butte, Montana, the ores of that district are said to have been very successfully treated by the Blake electrostatic separator from the technical standpoint.

A rock may be defined as a mass of matter composed of one or more simple minerals, having usually a variable chemical composition, with no neccessarily symmetrical form, and ranging in cohesion from mere loose débris up to the most compact stone.

In buying zinc ore in the Wisconsin district, a lime content in the ore in excess of 2 per cent. is commonly penalized at the rate of $1 per unit. Lime is, of course, as objectionable an element in the zinc retort as iron is, and is particularly undesirable when the ore contains both lime and iron (or manganese).

A copper smelting plant of 600 tons daily capacity, equipped with mechanical roasting furnaces, two large reverberatory smelting furnaces and waste heat boilers, recently completed, cost about $450,000. Estimating the yearly smelting capacity at 200,000 tons, this cost would correspond to $2.25 per ton of annual capacity.

In the gas-fired zinc distillation furnaces at Bethlehem and Palmerton, Penn., the consumption of anthracite for fuel is about two tons per ton of ore. In the direct-fired furnaces at Bethlehem, using rice size, it is 2.75 to 3.3 tons per ton of ore. In the producers connected with the gas-fired furnaces coal of No. 1 buckwheat size is used.

The smelter of the United States Zinc Company at Pueblo, Colo., was originally constructed and operated by the American Smelting and Refining Company in conjunction with Beer, Sondheimer & Company, of Frankfurt am Main, Germany, but now, we understand, the entire interest in the zinc company is owned by the American Smelting and Refining Company.

The effect of molybdenum upon steel is very similar to that exerted by tungsten, but it is much more strongly marked. The use of molybdenum in steel metallurgy is limited, however, by the difficulty in procuring pure molybdenum from its usual ores, and on account of the scarcity of these ores. For these reasons molybdenum is very little used in this industry.

In 1905 there were 1117 cement kilns in active operation in the United States as compared with 1067 kilns in 1902. In the earlier year, however, vertical kilns exceeded rotary ones by nearly 50 per cent., while in 1905 there were 327 more rotary kilns than vertical. Nearly all the portland cement in this country is burned in rotary kilns, there being, in 1905, only three factories that produced portland cement in vertical kilns.

The Betts process of electrolytic lead refining is now in use at one plant, viz., at Trail, B. C., but two other plants to use the process are in course of erection, one at Graselli, Ind., the other at Newcastle-on-Tyne, England. The operation of these new plants, which will embody the results of the experience gained at Trail, will show conclusively what advantage this process will offer as compared with the Parkes process of zinc desilverization and fire refining.

The quantity of carbon which a phosphoric iron is able to absorb in the blast-furnace or crucible depends upon the proportion of phosphide of iron which it contains. Pure iron containing no phosphorus may absorb about 5 per cent. of carbon. When the metal consists exclusively of ferric phosphide, Fe_3P, carbon is not absorbed according to any one general rule; a little more carbon may be introduced into an intermediate metal than into the phosphide. The amount is inversely proportional to the Fe_3P present.

Excluding the atmosphere and the hydrosphere, the principal constituents of the earth's crust are estimated to be present in the following proportions: Oxygen, 47; silicon, 28; aluminum, 8.2; iron, 4.6; calcium, 3.5; magnesium, 2.6; potassium, 2.4; sodium, 2.6; titanium, 0.41 per cent. Twelve other elements are present in amounts of less than 0.1 per cent., and of the remaining fifty, not one constitutes, probably, more than one-hundredth of one per cent. Included among these 50, however, are gold, silver, copper, tin, lead and the useful metals, except iron.

Experiments with the Carmichael-Bradford process for the desulphurization of galena have recently been made at the works of the United States Smelting Company, near Salt Lake City, Utah. This process, which is in successful operation at Broken Hill, N. S. W., is commercially dependant upon a supply of cheap gypsum. Inasmuch as that mineral is available in Utah in abundant quantity, and can be cheaply delivered at Salt Lake City, that district is better suited for the introduction of this process than any of the other lead-smelting districts of this country.

For the transportation of zinc concentrates from its mill at Franklin Furnace, N. J., to its smelteries at Bethlehem and Palmerton, Penn., the New Jersey Zinc Company employs pressed steel gondola railroad cars, with hopper bottoms. The car is planked over at the top and is loaded through hatches, which also can be closed. In this way, the cars can be loaded and unloaded at the minimum of expense, and all danger of loss of fine, dry ore in transit is eliminated. The system is an excellent one to apply for the transportation of any kind of valuable ore where the quantity to be carried is sufficient to warrant the operation of a special car-line.

The high market price of platinum should lead to extensive explorations for this metal. At present the only sources of platinum in the United States are the Rambler mine, of Wyoming, and certain of the river and beach sands in Oregon and Washington. A small amount of platinum is recovered annually at the United States mint at San Francisco from alluvial gold sent in from the placers of northern California and the other mentioned States. In British Columbia, platinum is known to occur in the placers along the Frazer and Quesnelle rivers, and much exploration has recently been directed to them.

Thorium, the element so highly valued for the making of incandescent gas mantles, is not an essential component of monazite, which mineral now affords the principal supply of thorium, but replaces an indefinite amount of certain other of the rare earths which go into the composition of monazite. These other constitutents have little or no value of their own, and it is singular that the value of monazite should depend altogether upon the fortuitous occurrence of thorium in it. Other minerals, thorianite, containing 75 per cent. thoria, and thorite, composed mainly of thorium silicate, both of which may be strictly considered as thorium minerals, have been found, though not in commercial quantities.

The best method of setting the ladders in the man-way of a shaft is to put in a sollar, or platform, every 16, 18 or 20 ft., and arrange the ladders from one to the other, so that they will be in parallel positions. This arrangement not only affords a greater inclination for the ladders than any other, but also renders it less likely that a man will drop through the opening in the platform if he loses his hold and falls. The best angle for a ladder is 20 deg. from the vertical, and it is a good rule to permit nothing less than 10 deg. A vertical ladder is always dangerous if its length be considerable and should not be installed for climbs of more than 100 ft. except for emergency purposes. The distance between the rungs of a ladder is an important matter; 10 in., center to center, is best; climbing upon ladders with the rungs 12 in. apart is decidedly more fatiguing. The carelessness as to ladders which prevails in many mines of the United States is strongly to be condemned.

THE ENGINEERING AND MINING JOURNAL

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The Metal Markets in August.

The market for copper, during August, manifested further strength, and at the end of the month the outlook for a continuance of the present level of prices throughout the remainder of the year is very favorable. Most of the producers of electrolytic are nearly sold out for October and November shipments and large sales have been made by some up to the end of December at the standard price of 18½c., delivered, 30 days, which is equivalent to about 18 5/16c., net cash, New York. Sales of copper for export have been made at higher figures, and the market closes at 18 5/16@18 9/16 for electrolytic and 18¾ for Lake, the latter having remained practically unchanged during the month, wherefore Lake and electrolytic have returned to substantially the usual differential of ¼c. per lb.

The strength of the present situation is due to the extraordinarily large demand for domestic consumption, increased demand for export and the failure of the mines to maintain the same ratio of increase in production as in the first half of the year. At the mid-year we estimated that the outlook was for a domestic production of 940,000,000 to 950,000,000 lb. in 1906, but recent developments have been adverse, and from present prospects it will be doubtful if the output exceeds 925,000,000 lb. The most promising of the new mines now being developed will make no production this year, and although some districts will show a considerable increase in their yield, there are others which will show none at all, a common difficulty being the inability to secure a sufficient supply of labor; especially has this been experienced in Arizona. In the meanwhile the activity in all manufacturing lines which require copper continues unabated. One of the best evidences of the strength of the present situation is that which the copper producers themselves have experienced, viz., the shortage in the supply of labor. This appears to be a serious difficulty in all parts of the country; notwithstanding the large immigration, the universal cry is for more men. In this respect Mexico and Canada are in substantially the same position as the United States.

Evidently, therefore, the immediate future of the copper market is dependent chiefly upon the foreign demand. During the first half of the year the exports fell off, even after disregarding the exceptional shipments to China in 1905, but now the buying from Europe appears to be reviving again. The rise in standard warrants at the end of August, was evidently due to the apprehension that the seismic disasters in Chile, together with their inevitable effect on the commerce of that country, would interfere with its usual shipments of bars. The policy of the American producers will doubtless be against a further rise in the price for the metal, which is already satisfactorily high, and toward the encouragement of contracts for deliveries far ahead, but the actual developments will be largely dependant upon the consumers.

In lead, spelter, tin and antimony, business was good during August, but the markets were devoid of special features and prices remained substantially unchanged during the month, except for tin which fluctuated between 37½ and 41½c.

Silver has been strong and steady throughout the month. Opening at 64¾c. in New York, it rose steadily to 66¾c., and no immediate recession seems probable. The French mint made some purchases, and the announcement that the United States Mint would take 100,000 oz. weekly for the balance of the year also helped the price. This silver is for subsidiary coin, the mint having exhausted the silver bullion accumulated prior to 1893. The main factor in the market, however, has been the strong and steady demand from the East, chiefly from India. That country has had a prosperous year, and steadily adheres to its old custom of investing its savings in silver. For the first half of 1906, the exports from London to India were, approximately, 72,100,000 oz. silver, more than double the shipments in 1905. China has been a moderate buyer, taking, for the first half of this year, 1,620,000 oz. from London and 320,000 oz. from San Francisco. It is known, however, that China has taken a great deal from Australia. Japan appeared in the silver market, after several years absence, taking 2,250,000 oz. from San Francisco; it is understood that this is for use in Korea and Manchuria chiefly. The known shipments to the East, without allowing anything for those from Australia, were 76,290,000 oz. for the first half of this year; and appear likely to be still greater for the second half.

The iron and steel markets in August showed a degree of activity unprecedented in midsummer. For two months or more previously, a certain degree of hesitation

had been manifest. With the opening of August, when large cotton and cereal crops seemed assured, there was a rush to buy foundry iron, which sent prices up with a bound; while late purchasers found difficulty in placing their orders. The advance in pig iron prices has been from $1 to $1.50 per ton, with premiums paid, in many cases, to secure deliveries. The market for finished material has also been strong, especially for structural steel, and mills are fairly overwhelmed with work. The rail mills and structural mills are supplied with orders well into next year; and the only trouble is the difficulty in securing sufficient labor.

World's Coal Production in 1905.

In keeping with the great industrial activity that took place in 1905, and is still in effect, the production of coal during that period met the demands of trade in a most satisfactory manner.

The complacent attitude with which coal mining is viewed by the general public is due to a realization of the fact that we are not nearing a possible exhaustion of our fuel resources. It is probable that devices and inventions will continue to be perfected and used to cause further economy in the consumption of coal; but the idea that anything will be able to displace coal as a fuel, or as a generator of power, is absurd. Coal will continue to be the heart of industrial progress for generations to come, and were it not for its wide distribution throughout the world, there could be a well founded fear of those who might use their power of control of this commodity not only to check progress, but to cause intense suffering as well. It is needless to call attention to the disastrous results which follow a suspension of coal mining in only one or two sections of our country; what would occur after a general suspension is not difficult to imagine. For this reason the public have rights that neither capital nor labor should be permitted to jeopardize, and the encouraging phase of the question, at present, is due to the generally distributed ownership of our mines, although in recent years the tendency to consolidate interests has grown.

The coal production of the United States, which reached a total of 351,187,209 short tons in 1904, was still larger in 1905, the total being 388,772,167 short tons, a gain of 6.3 per cent.

The gain in coal production is steady in most of the world's fields. The production given in the following table is taken from statistics compiled for Vol. XIV of *The Mineral Industry*, and for means of comparison is given in metric tons, the world's standard measure:

COAL PRODUCTION OF THE WORLD.
(In metric tons.)

Countries.	1904.	1905.
Asia:		
India	7,682,319	7,921,000
Japan	11,600,000	11,895,000
Australasia:		
New South Wales	6,116,126	6,035,250
New Zealand	1,562,443	1,415,000
Other Australia	769,723	805,000
Europe:		
Austria Hungary	40,334,681	40,725,000
Belgium	23,380,025	21,844,200
France	34,502,289	36,048,264
Germany	169,448,272	173,663,774
Italy	359,456	307,500
Russia	19,318,000	17,120,000
Spain	3,123,540	3,199,911
Sweden	320,984	331,500
United Kingdom	236,147,125	239,888,928
North America:		
Canada—		
Western	2,619,816	3,183,909
Eastern	4,194,939	4,775,802
United States	318,275,920	352,694,110
South Africa	3,015,000	3,218,500
All other countries	4,250,000	4,550,000
Total	867,020,658	929,622,648

In most cases these reports are from official sources; in others they are estimated as closely as possible from shipping returns and other data. The increase in 1905, as compared with 1904, reached a total of 62,601,990 tons, or 7.2 per cent.; an important gain.

As may be noted from the table, the production of coal in France and Germany has substantially increased, while the output of Belgium and Russia has fallen off. The United Kingdom also produced more coal in 1905, and still remains the largest exporter of fuel. No other country can show such an increase in production as the United States, and from present outlook, the wonderful development that has been taking place is likely to continue.

The Cost of Producing Copper.

The interesting article of Mr. Beardsley, published in this issue, pertinently calls attention to the omission by the non-professional of several important elements in their estimates of the cost of producing copper. His comments are of course, equally applicable to the estimates of the costs of producing other substances, and no doubt he might safely go further and criticize not only the non-professional, but also a good many professional men for oversight of important particulars in estimating the cost of production. As Mr. Beardsley points ont, the development, general and marketing expenses are apt to be either overlooked entirely or else greatly underrated in preliminary estimates, but they are very real charges when they figure in the results of actual operation.

Mr. Beardsley might have gone further, however, and pointed out the necessity for an allowance of depreciation of plant, or amortization, which is a further charge on the gross profit of direct operation. Before any profit can be realized, a mining and metallurgical plant must be provided, and it is to be expected that the profit per ton of ore will not only pay a fair profit on the entire investment, but also will return the principal. It is assumed that in all properly compiled accounts, the plant will be kept in good working efficiency by a liberal outlay for repairs, but machinery, furnaces, etc., wear out beyond the ability of ordinary repairs to maintain them, and sooner or later must be entirely replaced. The accounts of the producing companies are frequently doubtful as to items of this character. The conclusive record of cost of production is the gross receipts for a period of years minus the dividends paid.

A Miners' Eight-Hour Day.

The Home Secretary of the British Government has just appointed a committee to inquire into the probable economic effect of a universal eight-hour day for mines in the United Kingdom. This committee is independent of, and in addition to, the Royal Commission recently appointed to inquire into safety in mines. The miners' political leaders are at present agitating for an eight-hour day, reckoned from bank to bank. It is not necessary for us at the present to discuss the subject of inquiry, but one interesting point in connection with the committee is to be noted. We refer to the fact that two experienced mining men find places on the committee, viz., Professor Cox, of the Royal School of Mines, and Professor Redmayne, of the University of Birmingham. When the Royal Commission mentioned above was appointed, we remarked with regret the absence of independent mining engineers among the names. The present appointments are much more satisfactory.

The Boston Consolidated, Bingham, Utah.

STAFF CORRESPONDENCE.

Only about four years ago the Boston Consolidated was simply a name. Besides its then little appreciated mass of low-grade porphyry, it owned a group of old gold mines which it had been prospecting for copper since 1897. Extensive prospecting had been done and several adits had been driven, but they had not been driven far enough to catch the orebody. Considerable development had also been done upon some stringers of rich copper ore occuring in the foot-wall, but these did not make into orebodies of any great size.

Now this company is one of the most promising in Bingham. It has begun the construction of a 3000-ton concentrating plant to treat its low-grade copper ores and it now has a large body of sulphide ore averaging 3 per cent. copper and $4 to $4.50 in gold blocked out. At present it ships 380 tons of this ore to the Bingham smelter at Murray, and is only waiting for the completion of the plant of the American Smelting and Refining Company at Garfield, when it will ship about 1000 tons a day of this ore.

In 1879 the old Stewart orebody of oxidized gold ore—the oxidized capping of the sulphide deposit of the Boston Consolidated—was discovered. For several years 30 stamps treated this gold ore from the Stewart No. 1 and No. 2, but in 1894 the mill burned down. Nothing further was done until 1897 when the present company was formed. Considerable prospecting was immediately undertaken, but in vain. The company finally learned from a miner, who had worked in the old Stewart mine, that in a certain one of the old tunnels a considerable body of sulphide ore had been found, but these workings had been abandoned as the milling ore near the sulphide was too base and would not amalgamate well.[1] This tunnel had caved long ago, but the company found the rails marking the location of the old tunnel. The caved rock was spiled through, following the track in all its crooks and turns, until at its end the sulphide orebody was found. Since then a large body of this sulphide ore has been developed, and last October a second orebody—the "upper channel" ore—was discovered in the overlying limestone.

ORE BINS.

This sulphide ore occurs bedded with the strata. The lower, or Peabody, orebody occurs at the contact between the quartzite and the overlying limestones. Separating this from the upper channel orebody is a stratum of limestone about 30 ft. thick, but varying according to the thickness of the Peabody ore. Both these orebodies were formed by replacement in the limestone. They run east and west and dip to the north at an angle varying from 30 to 50 deg. Two approximately parallel faults, about 600 ft. apart, having a northeast trend and a dip of about 80 deg. to the south and east, cut off the orebody. The continuations have not been found as yet.

SWITCHBACK ON CARR FORK SIDE OF RIDGE.

The Peabody orebody has been opened up for about 330 ft. along its strike and is about 240 ft. wide, its thickness ranging from 35 to 65 ft. The upper channel has been developed for about 400 ft. along its strike and is 60 to 65 ft. wide. It varies from 30 to 60 ft. in thickness. The whole vein is a mass of iron sulphide, carrying some chalcopyrite and a little chalcocite and pyrite. In a few places bunches of more silicious ore occur. The content in copper varies considerably in different parts of the mine, being 5 to 6 per cent. and even more in some parts, but the ore is so stoped that the shipments average about 3 per cent. copper. This ore carries an iron excess of 15 to 18 per cent., for which payment is made by the smelter.

The sulphide deposit is opened up by three adits, viz., the Armstrong No. 1, 2900 ft. long; the Peabody, 2600 ft. long and 105 ft. higher; and the Top level, 160 ft. higher, in which the sulphide ore was first found. The Armstrong No. 2, which is 250 ft. below the Armstrong No. 1, is in 300 ft. Ore was struck in this tunnel, but nothing has yet been done on this ore.

The ore is mined by a system of square sets of peculiar framing. The timbers are framed in Oregon, whence they are received ready for use. All the ore is sent by chutes down to the Armstrong No. 1, where it is hauled by a 15-h.p. Westinghouse electric locomotive in trains of eight cars to the 600-ton ore-bins placed along the Copper Belt R. R. tracks near the portal of the tunnel. The cars are 16 cu.ft. in capacity and hold about 1.5 tons of ore. The ore-bins are being enlarged so that they will hold 1300 tons. Sullivan drills, 2¼-in., are used in the stopes but larger ones are employed in development work. A man on a "chippie" machine can drill and break a set of ground a day which is about 20 tons of ore. The ore is soft and the sets have to be lagged. Two-inch planks are used for this and also for flooring the sets. The limestone hanging of the upper channel is strong, but the limestone between the two orebodies is rather soft. No filling is used except where necessary to steady the stope in the upper channel. This waste filling all comes from development work, for no waste occurs in the vein.

The company will shortly have the railroad completed so that it can begin to

[1] While the mine was worked for gold any occurrence of sulphide was concealed, for it was considered a very unfavorable indication. This fact was the cause of the difficulty in locating the underlying copper orebody. Moreover, faulting had dislocated the orebodies, and so the tunnels had failed to strike them in depth.

strip its low-grade porphyry ore, which is an extension of the porphyry deposit of the Utah Copper Company. Three Vulcan steam shovels with dippers holding 3 cu.yd. will be used. It is necessary to strip off from this ore a leached capping of porphyry, varying from 30 to 60 ft. in thickness. Five locomotives and 50 cars having 12 cu.ft. capacity will be used. A run of only a quarter of a mile is necessary to take the waste around into Carr Fork cañon where it can be dumped. As the contour is very even the steam shovels working in open pits will be used to mine the ore after it is stripped. Blasting will be necessary to break up the ore, and also the capping, so that the shovels can handle it. Stripping will go on for seven or eight months and then when the mill is ready the mining of the porphyry ore will begin.

[The work of stripping by steam shovels has now been begun.—Editor.]

Abstracts of Official Reports.

Nipissing Mines Company.

This company, organized in the United States, with headquarters in New York, has an authorized capital of $12,000,000 in shares of $5 each. The stock issued is $6,000,000. The company owns all the stock of the Nipissing Mining Company, a Canadian corporation, which is direct owner of the property. This consists of eight claims, or 846 acres, in the new Cobalt district in Ontario. The report covers the operations of the company from its organization in the fall of 1904, up to March 31, 1906, a period of about 18 months. It is, so far as we are aware, the first official report issued by any company, operating in the Cobalt area.

The production report covers the period from the opening of the mines up to Jan. 13, 1906, about 15 months. The statement of production up to that time is as follows:

	Quantity.	Value.
Ore shipped, net weight.	1,728,695 lb.	. ... .
Ore shipped, dry weight.	1,677,446 lb.	.....
Products returned:		
Silver.....	1,360,492 oz.	$865,553
Nickel..	35,444 lb	836
Cobalt.....	145,046 lb.	107,700
Arsenic	78,525 lb.	381
Total value....		$974,470

From Jan. 13 to March 31, there was mined, in addition to the above, 239,279 lb. of ore, of an estimated value of $155,060; making a total return of $1,129,530 up to the close of the fiscal year.

The income statement is given in the report as follows:

Sales of product of mine	$1,160,352
Profit on ore purchased.....	16,906
Total receipts.....	$1,177,158
Mining and all other expenses.....	152,630
Net earnings.....	$1,024,628
Paid stockholders.....	400 000
Surplus.....	$624 628

This surplus is made up as follows: Ore on hand and in process of refining, $194,269; accounts receivable, $170,000; cash, $260,359; total, $624,628.

Like all the mines in the district, the veins are narrow, but carry high values. The workings so far have been entirely by open cutting, only a small depth having been reached. The cost of mining is high, approximately $100 per ton of ore; but the values are so high, that over 90 per cent. of the returns have been profit. Owing to the nature of the veins and the method of mining, there is no ore blocked out ahead. The company is putting up pumps and other machinery to remove the surface soil by hydraulicking. This will reduce the cost of moving overburden, and may also reveal the existence of veins other than those now known. The deepest opening yet made on the property is

SULPHIDE MINE, SHOWING MACHINE FOR TAKING TIMBER TO UPPER TUNNELS.

50 ft.; but it is probable that several shafts will be started, to test the values down to 200 ft., or more.

Whenever the hoisting or lowering of men occurs before daylight or after dark, or when the landing at which men take or leave the cage is at all obscured by steam or otherwise, there should be maintained at such landing a light sufficient to show the surrounding objects distinctly. Likewise, as long as there are men underground in any mine, the operator should maintain a sufficient light at the bottom of the shaft so that persons coming out may clearly discern the cage and objects in the vicinity.

The Governor of the island of Saint Helena reports the discovery, late in 1905, of a considerable deposit of manganese ore of good quality.

New Publications.

"The State Engineer and His Relation to Irrigation." By R. P. Teele. U. S. Department of Agriculture, Bulletin No. 158. Pp. 99. 6x9 in.; paper. Washington, 1906: Government Printing Office.

"Report on the Geology of the Cuyuni River, from Arawak Matope to the Akarabisi Creek, British Guiana." Pp. 19. 8x13 in.; paper. Georgetown, Demarara, 1905; Estate of C. K. Jardine, Government Printer.

"Preliminary Report on the Geology of the Lower Essequebo River, the Groete Creek District, and the Lower Cuyuni River, British Guiana, Pp. 12 8x13 in.; paper. Georgetown, Demarara, in 1903; C. K. Jardine, Government Printer.

"Underground Water Papers, 1906." Myron L. Fuller, Geologist in Charge. U. S. Geological Survey, Water Supply and Irrigation No. 160. Pp. 104; illustrated. 6x9 in.; paper. Washington, 1906: Government Printing Office.

"Contributions to Economic Geology. 1905." S. F. Emmons and E. C. Eckel, Geologists in charge. United States Geological Survey, Bulletin No. 285; Series A, Economic Geology, 73. Pp. 508; with maps. 6x9 in. Washington, 1906; Government Printing Office.

"Report on the Petrography of the Cuyuni and Mazaruni Districts, and of the Rocks at Omai, Essequibo River, with Some Notes on the Geology of Part of the Berbice River, British Guiana." Pp. 71. 8x13 in.; paper. Georgetown, Demarara, 1905: The Argosy Co., Ltd., Government Printers.

"Destructive Floods in the United States in 1905, with a Discussion of Flood Discharge and Frequency, and an Index to Flood Literature." By Edward C. Murphy. U. S. Geological Survey, Water-Supply and Irrigation Paper No. 162. Pp. 105; illustrated. 6x9 in.; paper Washington, 1906: Government Printing Office.

"A History of the Northern Securities Case." By Balthasar Henry Meyer. Bulletin of the University of Wisconsin, No. 142. Pp. 350; with map. 6¼x9½ in.; Madison, Wis., 1906; the University of Wisconsin. Price 60 cents.

In this monograph Prof. Meyer has given a condensed and connected history of one of the most noted of recent cases. It is of special value, because the only accounts of the case up to date have been in newspaper and law reports, scattered and difficult to trace. While in itself a railroad case, it has bearings on the organization of holding companies, those devices of modern finance which have lately been so much used in mining and manufacturing, as well as in railroad organizations. Prof. Meyer's work on this monograph has been well and thoroughly done.

Personal.

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

S. McEwen passed through Denver a few days ago on his way to New York.

C. Czezk, a well known mine operator in Utah, spent a day or two in Butte, Mon., recently.

G. Scott Anderson, a mining engineer of Wallace, Idaho, spent several days in Butte, Mon., recently.

D. C. Jackling, manager of the Utah Copper Company, has returned to Salt Lake from a trip to Spokane.

James E. Chapman, of Kansas City, Mo., has been spending a few days in the Wisconsin zinc and lead district.

Edward Skewes, of London, passed through New York last week, on his way to British Columbia on professional business.

H. L. Brown has been appointed engineer of construction work for the Transvaal Mining Company at Cumpas, Sonora, Mexico.

William Campbell, of the Columbia School of Mines, has been making an inspection of Utah mines and ore reduction plants.

G. D. Doveton, of Doveton & Purington, has returned to Denver after three months spent in California on professional business.

Prof. Herdt, of McGill University, Montreal has returned from attending the meeting of the International Electrical Commission in London, England.

Charles H. Palmer, manager of the property of the Davis-Daly Estates Company, is back in Butte, Montana, after an absence of several weeks in Boston.

E. C. Collins, formerly manager of the Wolverine Mining Company, of Bisbee, has gone to Tonopah, to take charge of extensive development operations there.

Daniel Fisher has resigned his position at the Quincy mine, Houghton, Mich., after 13 years service, to become chief clerk of the Hancock Consolidated Mining Company.

H. B. Howland, president of the Globe Consolidated Copper Company, has left Duluth, Minn., for an extended stay at Globe, Arizona. Permanent development work at the mines is just beginning.

Franklin W. Smith, of the Smith Engineering Company, of Bisbee, Ariz., has left Duluth for the East prior to returning to Pachuca and Mexico City, where he will be during the coming season.

Oscar Lochmund, formerly manager of the Reforma mine in Coahuila, Mexico, has resigned to accept a responsible position with the United States Smelting and Refining Company at Salt Lake City, Utah.

J. Davis, consulting engineer and undersecretary of public works for New South Wales, Australia, is in Canada in the course of a trip undertaken for the purpose of studying the irrigation systems in various countries.

James McEvoy, formerly of the Geological Survey, of Canada, now chief engineer for the Crow's Nest Pass Coal Company, has returned to Fernie, Crow's Nest Pass, East Kootenay, B. C., from a business visit to Winnipeg, Manitoba.

A. R. Wilson, for the last five years superintendent of the Crow's Nest Pass Coal Company's colliery at Michel, Southeast Kootenay, British Columbia, has been appointed superintendent of the Lundbreck coal mines in southwest Alberta.

W. J. Elmendorf, of Spokane, Wash., has gone to Whitehorse, Yukon Territory, on a visit of inspection of mining properties for clients. Before returning to Spokane he will make a trip up the Skeena river, northern British Columbia, on similar business.

Horace V. Winchell, formerly chief geologist for the Amalgamated, with headquarters in Butte, but now at the head of a similar department in the Great Northern Railway Company, with headquarters in St. Paul, is spending a few days in Butte, Montana.

Chas. T. Arkins, of the Seattle, Wash., office of the Allis-Chalmers Company, is in Dawson, Yukon Territory, assisting in an investigation the Canadian Government is having made relative to the extent and value of, and the best method of treating, the "White Channel" gravels.

T. C. Denis, of the Canadian Geological Survey, has returned from the investigating the natural gas well at Pelican Portage on the Athabasca river in northern Alberta. He reports the supply plentiful, the gas being within 800 ft. of the surface, but not available practically owing to the great distance from any center of population.

Newton W. Emmens, has returned to Pittsburg, Penn., after having spent several weeks examining the Silver Dollar and other mining properties in Lardeau, British Columbia. Mr. Emmens is expected to return to that district shortly to supervise the work of opening up and equipping the Silver Dollar and Broadview mines.

C. H. Macnutt and E. C. Vigeon have resigned their positions as general manager and assistant general manager respectively, of the Societé des Mines de Cuivre de Catemu, Chile, to accept the joint management of the Cutter Cove Copper Mining Company in the Straits of Magellan in conjunction with a general consulting practice.

R. W. Brock, of the Geological Survey, of Canada, has been authorized by the director of the survey, A. P. Low, with whom he has been visiting the Boundary district of British Columbia, to proceed at once to Franklin camp in that district to look over mining conditions there. Professor Brock made a brief visit to that camp in 1900, but at that time very little work had been done. Recently prospecting had disclosed the occurrence there of large bodies of copper ore.

Obituary.

T. S. Austin, for many years connected with different smelting companies in the West, died at El Paso, Texas, Aug. 23, after a long illness. Since the organization of the American Smelting and Refining Company he had been district manager at El Paso.

Robert M. Fisher, a young mining engineer, aged 25, while making an examination of a property near Empire, Colo., a few days ago, accidentally fell down the main shaft, 200 ft. deep, and was instantly killed. He was a graduate of the College of the City of New York, class of 1808. and completed his studies at the Columbia University School of Mines.

Henry J. Colwell, of Norway, Mich., one of the pioneers of the Menominee range, died this week at that place. He was associated with Samuel J. Tilden, of New York, in the ownership and management of the old Michigan Iron Company. He was a man of prominence and held many positions of trust, and at the time of the failure of the Michigan Iron Company Mr. Colwell spent years in earning the funds to square up all indebtedness.

Charles W. Leimer was killed by an avalanche near La Junta, Chile recently, He was 28 years old and was born and educated in Denver, Colo. After leaving school he entered into mining work and soon attracted attention by his energy and his unusual ability in handling men. This secured him prominent positions, notwithstanding his youth. He had charge of the California King mill at Picacho, Cal., for a time and later of the Montana Zinc plant near Butte. Early in the present year he went to Chile, to take charge of the plant of the Braden Copper Company at La Junta. From the brief report received by his parents in Denver, it is believed that he was on a prospecting trip through the mountains when he was killed.

Societies and Technical Schools.

American Institute of Social Service—This society will hold in New York City, in January next, an exposition of devices for safeguarding the lives and limbs of working men and women, and for preventing accidents under the ordinary conditions of life and labor to which the general public is exposed. This will be the first exposition of the kind in this country, although several European countries have regularly established museums for

displaying the progress of this art. That these expositions and museums have been of real value to their respective countries is evidenced by a comparative study of the number of accidents in Europe and in America, which shows that for the same number of men employed in a given trade, we have from two to nine times as many accidents as they have in European countries.

The interest of manufacturers generally is solicited, as well as that of organizations whose special function is to improve the conditions of labor, and a widespread response is looked for to this request for representation in the nature of photographs, descriptive drawings, models, and as far as possible, the devices themselves in actual operation. Following are some of the groups of exhibits:

(a) Protective devices for boilers, water gages, signal apparatus, boiler and pipe valves; also protective devices for electrical machinery and acetylene apparatus. (b) Mining and quarrying; devices in use on stone-crushing machinery, etc. Storing of explosives. (c) Metal industry: safety devices for metal-working machinery. (d) Safety appliances for elevators and hoisting-apparatus models.

Requests for information regarding space should be made to Dr. William H. Tolman, Director, 287 Fourth Avenue, New York. The west hall of the American Museum of Natural History has been loaned for exhibition purposes.

Industrial.

A number of large cement plants in the United States have installed Allis-Chalmers breakers and tube grinders, but it is interesting to note that the East Rand Proprietary Mines, Ltd., of South Africa has recently bought two 5x22-ft. wet tube-mills, and the DeBeers Consolidated Diamond Mines, of Kimberly, has bought one mill of the same size and pattern.

The Stromberg-Carlson Manufacturing Company, N. Y., reports having closed contracts for switchboards for the following places: Port Byron, N. Y.; Shickshinny, Penn.; Packwaukee, Wis.; Knoxville, Tenn.; Port Williams, Wash.; Waterport, N. Y.; Sioux City, Ia.; St. Marys, W. Va.; Shell Mound, Tenn.; Bridgeport, Minn.; Kentwood, La.; Palouse, Wash.

The De La Vergne Machine Company, New York, reports the following recent orders for Hornsby-Akroyd oil engines; Central New England Railway Company, 7 h.p. geared to pump; F. J. Stokes Machine Company, Philadelphia, Penn., 25 h.p.; Hastings Pavement Company, New York City, 16 h.p.; Union Ballast Company, New York City, one 20-h.p. and one 32 h.p.; Webb Wire Works, New Brunswick, N. J., 32 h.p.; Lippincott, Scott & Meyer, Little Rock, Ark., 50-h.p. engine to drive a De La Vergne ice machine.

The tube-mill, manufactured by the Colorado Iron Works Company, in Denver, Colorado, is especially designed for fine grinding of ores in cyanide solution. The Dorr classifier, manufactured and sold by the same concern, is adapted to the separation of flocculent slimes from the purely silicious material. The tube-mill not only effects fine pulverization, but brings every minute particle of material into direct contact with the cyanide solution and affords as much aëration as is necessary. Another good class of work is the manufacture of grinding pans for fine grinding in connection with cyanide treatment or amalgamation. One of these pans was recently made by this company for the Homestake mills in the Black Hills, South Dakota.

The International High Speed Steel Company, of New York, is introducing a "Rolled Hollow" steel designed for making bits suitable for air-hammer drills. The rapidity with which these hammers work makes it necessary, in all drilling operations, save stoping, to use hollow bits, so that the layer of fine dust in the drill hole may be driven out by air sent through the bit. Drill manufacturers have been making up the hollow bits for their own machines, and selling them in sets of various sizes, all ready for use when tempered. Until recently it was impossible for the mines to make their own bits, because the steel had to be drilled, and few mine machine shops are equipped for such work. But of late it has been found possible to roll a high-grade steel with the necessary hole running through the bar, of ample clearance for drilling purposes, making it an easy matter for every mine to make its own bits, buying the steel in the bar and using it as required.

Trade Catalogs.

Receipt is acknowledged of the following trade catalogs and circulars:

New York Edison Company, New York City. Bulletin V, No. 8, August, 1906; pp. 16, illustrated; paper, 6x9 in.

H. W. Johns-Manville Company, 100 William street, New York City. "Victor" Combination Meter; illustrated folder.

F. E. Keyes & Son, 20 Broad street, New York City. Advance Feed Water Purifiers; Pp. 4, illustrated; paper, 3x10 in.

C. W. Hunt Company, West New Brighton, N. Y. Pamphlet No. 064, Hunt Industrial Railways; pp. 44, illustrated; paper, 3x5 in. 1906.

Allis-Chalmers Company, Milwaukee, Wis. Bulletin 1416, July, 1906. Gates Rock and Ore Breaker Style "K"; Pp. 28, illustrated; paper, 8x10 in.

Wilson-Maeulen Company, 110 Liberty street, New York City. Recording Pyrometers for High or Low Temperatures; Pp. 4, illustrated; paper, 5x8 in.

Fort Wayne Electric Works, Fort Wayne, Ind. Bulletin No. 1080, June 1, 1906. Multiphase Revolving-Field Generators Engine-Driven; Pp. 16, illustrated; paper, 8x10 in.

Rockwell Engineering Company, New York City. Catalog. F. Rockwell Fuel Oil Burning Appliances; Pp. 18, illustrated; paper, 6x8 in. Annealing and Hardening Furnace with Oil Burning Outfit; Annealing and Hardening Furnace (Oil or Gas Fuel); Flue Welding Furnace (Oil or Gas Fuel); Double Chamber Metal Melting Furnace; Pot Furnaces for Lead and Cyanide Hardening and for Melting Soft Metals; Rockwell Rivet Heating Furnaces; Brazing Furnaces; each containing pp. 4, illustrated; paper, 6x8 in.

Construction News.

Thunder Mountain, Idaho—A cyanide plant is to be put in at the Sunnyside mine. John Treweek is manager.

Pioche, Nevada—The Ohio & Kentucky Mining Company is in the market for the purchase of hoisting and other mine equipment. Address at Pioche.

Ball Mountain, Colorado—Machinery for shaft sinking and hoisting is to be put in at the Leopard mine. Dwyer & Co., Leadville, Colo., are lessees.

Red Dog, California—It is proposed to put in a stamp mill at the Nevada Drift mine, which is owned by Jerry S. Goodwin and associates, of Nevada City.

Durkee, Oregon—The Gold Coin Mining Company will rebuild its stamp mill, or, rather, put in a new one to replace the mill recently destroyed by fire. T. W. Ayres, Baker City, Oregon, is manager.

Rossland, British Columbia—At the Center Star mine, which, together with the adjoining War Eagle, is owned by the Consolidated Mining and Smelting Company of Canada, electricity is to be substituted for steam for driving the big air compressor. For this purpose a 650-h.p. Canadian Westinghouse type CCL induction motor, 180 r.p.m., 2000 volts, three-phase, 7200 alternations, has been ordered and is due to reach Rossland in September. The 40-drill compressor, to be altered to two-stage air to meet the changed conditions, is a Canadian Rand Drill Company's compound steam engine with steam cylinder 22 and 40x48 and air cylinder 36 and 22x48. To the 30x60-ft. building an L-shaped addition has been made, dimensions 60x70 ft., to make room for the motor and also for the War Eagle 25-drill Ingersoll-Sergeant electrically-driven compressor which is to be removed to the Center Star power-house. The cement concrete foundations for the machines have been completed and the above mentioned changes will be made shortly.

Special Correspondence.

San Francisco. Aug. 23.

Alphonso A. Tregidgo, president of the California Miners' Association, has established an office for that organization at 1423 Sutter street, in this city, and has appointed E. J. Ensign, editor of *Pick and Drill*, acting secretary. The next annual meeting of the association will be held in this city in November, and preparations are being made to receive the delegates. The fire destroyed all the records and data which had been collected by the association. As the annual report of the association was burned on the press, a new one has been prepared and is in the printer's hands. It will be issued about Sept. 15. It is the intention to try and revive interest in the association, which has been of great benefit to the mining industry of the State.

The search for copper properties throughout California, continues, and new sections where the metal is found are being thoroughly prospected. In Siskiyou county, long known as a gravel mining section, location notices for over 9000 acres of copper-bearing ground were filed during the month of July alone. The principal localities affected by these location filings are Glass mountain, Elliott creek, Little Humbug, Salmon river and the vicinity of Sisson. Even up in Alpine county, near Loope, a large body of copper ore has recently been found. The copper properties of Plumas county are known to be of value, but will not be productive until the completion of the Western Pacific railroad. The mines are too far from transportation facilities at present. The most interesting point in the State just now, as far as copper is concerned, is the Greenwater copper camp in Inyo county, about 15 miles from the Nevada line. The mineralized zone is of great extent, and some of the ledges show great width on the surface. The camp is at an altitude of 6500 ft. Hundreds of men are flocking there to prospect. A number of men prominent in the copper mining industry have gone themselves, or sent agents to secure bonds on some of the properties. Thus far, of course, there has been little development, but this is in progress. The water difficulty has been overcome as tank wagons are bringing in water from distant springs. The deepest shaft in the district is that of the Furnace Creek Copper Company, which is 180 ft. deep.

The Board of Supervisors of Sacramento are getting after certain hydraulic miners on the American river and its tributary streams, who are said to be dumping their débris so that it is carried down and injuring lands in Sacramento county. It has been ordered that suits be commenced by the county to enjoin these men from further operations.

The Omega Placer Mining Company has bought at Omega, Nevada county, the Omega and Hathaway Consolidated mining properties, owned by N. C. Tully. The company has been working the mines under bond for some time and has put in one of the finest restraining dams in the State, the basin behind which will hold all the debris which can accumulate in many years.

The old mining town of Johnsville, Plumas county, where are located the Plumas-Eureka, Four Hills, Jamison, and other mines, has been almost totally destroyed by fire. None of the mining plants was injured, however. There have also been bad forest fires in Tuolumne county, where thousands of acres have been burned over. Several of the mining plants in the path of the fire had narrow escapes from destruction.

There having been some complaint about the accuracy of the distances named on the new desert guide posts recently put in position in Riverside and other Southern California counties, a mining man having interests in the Chuckawalla and Eagle mountans, has taken the trouble to test by means of an odometer, the accuracy of the marked distances. He states that, as the posts now stand, the county has reason to be congratulated on their accuracy. A man or child can go anywhere on the desert by the aid of these guide posts with safety. They are so placed that they will be there for ages after the present generation of kickers has long passed away, and will always be friendly helpers to weary prospectors and travelers.

For once a mining company thrown into bankruptcy seems to have done all the better for that circumstance. The instance is that of the Copper King, Ltd., of Fresno county. On May 29, 1903, creditors filed a petition alleging that the corporation was bankrupt, and when the schedule was filed it was found that the company owed $614,223 and had $300,000 assets. The highest bid offered for the property by Referee Green was $5000. This week he announced that after three years in bankruptcy he was able to promise that all the creditors would receive dollar for dollar of that indebtedness out of the earnings of the mine. It has been worked under the direction of Geo. W. Ade, as trustee for the creditors. The mine had become flooded with water and the trustee was granted permission to drain it and extract the ore that had been blocked out. The draining was done at an expense of $2500. W. J. Adams, an expert, was employed to examine the property and he reported 35,000 tons of ore in sight. This worked up at a net profit of $175,000, after deducting all expenses of extracting and shipping to Tacoma to be smelted. An additional sum of $10,000 was realized from the sale of personal property not needed. The mine is now being worked diligently and has paid up to date $70,000 in dividends to the directors. The smelter was sold at a profit of $15,000 and the $100,000 mortgage was wiped out. Referee Green reports plenty of ore in sight and expects that within a short time enough will be realized from the proceeds to pay the creditors dollar for dollar.

Officers of the American Mining Congress have asked Governor George C. Pardee, of California; Senator Fred T. Dubois, of Idaho; Senator Robert La Follette, of Wisconsin; Governor Joseph Folk, of Missouri, and Congressman Eben W. Marten, of South Dakota, to draft for submission to the Legislatures of most of the Western States this fall a measure intended to put an end to swindling mining operations by the promotion of fake enterprises. It is probable that the measure drafted will be similar to the law now in effect in this State, which has been successful in ridding California of numerous swindling mining companies. The best feature is its deterrent effect, as the men who promote such schemes are afraid to begin illegitimate operations within the borders of California, knowing the law is such that they may easily be brought to book.

The rates offered by the Mammoth company's smelter at Kennett, Shasta county, California, for silicious ores are such as to encourage renewed work on the part of the owners of small quartz mines in Josephine, Douglas and Jackson counties, Oregon, and more or less shipment of such ores is now going on. Some of the mines now shipping to Kennett have heretofore been selling their ores to the smelter at Tacoma, Washington.

Salt Lake City. Aug. 25.

A syndicate of mine operators of this city has purchased control of the Pioneer sampling plant at Sandy, Utah, and Charles D. Rooklidge of Salt Lake has been retained as manager.

The annual meeting of the Ohio Copper Company, owing to the inability of certain Eastern shareholders to be present, has been adjourned until Aug. 29. Matters pertaining to the financing of the company for extensive operation will be considered.

The Old American Mining Company has filed articles of incorporation to operate in the Tintic district. A. W. Schmidt is president and Judge O. W. Powers, vice-president; both of Salt Lake.

The Gemini Mining Company, operating in the Tintic district, has contracted its output to the United States Smelting, Refining and Mining Company for a period of years. It amounts to about 1500 tons monthly.

The Siegel mines at Siegel, Nevada, are shipping an average of two cars per week to Salt Lake smelters.

The custom sampling mills of the Salt Lake valley are doing a tremendous business. Some operators have been unable to get their ore released under a week or ten days. A similar condition has existed at

the smelters, and railroad companies have been allowed to tax demurrage before cars could be unloaded.

Considerable interest is being manifested in the Black Horse district, near Osceola, Nevada, where some recent important finds have been made.

The ore and bullion settlements last week aggregated a total of $518,500.

The management of the Cliff Mining Company, owner of the Buckhorn mine at Ophir, has placed an order for a Bleichert aërial tramway. It will be about a mile long and convey ore from the mine down to the town of Ophir.

Denver. Aug. 25

The Iron Silver Mining Company, one of the oldest producers in the Leadville district, having been operated steadily for more than 25 years, has just declared a quarterly dividend, amounting to $100,000, payable October 1, which makes a total record of $3,800,000 paid.

The District Court has granted a temporary writ of injunction to the Henry Adney Gold Mining Company, against the Indicator Gold Mining Company, et al., to restrain the latter from sinking their shaft further, on the ground that it would endanger the lives of miners in the former property by the flow of water.

A secret investigation on the part of government experts is going on in connection with alleged fraudulent coal land entries in the Hagan district in Bernalillo and Verranee counties in New Mexico, and a large number of entries will probably be cancelled.

The news of the death of T. S. Austin, district manager of the American Smelting and Refining Company, at El Paso, Texas, was received here yesterday with much regret, he having been well known here for many years.

About a mile south of Montrose, an oil well will be sunk 3000 ft., in order to test the gas and oil supply in that vicinity. Three carloads of machinery have just arrived there to be erected at once.

The secretary of the American Mining Congress, which is to meet here on Oct. 19, has issued the call for the annual convention.

The Colorado Fuel and Iron Company has put a force of 100 men at work, preparing to open its new properties at Morley, 10 miles southwest of Trinidad.

During the coming session of our legislature next winter, a strong effort will be made to enact laws leading toward the extermination of fake mining concerns, with the literature of whose promoters financial centers have of late been flooded. These proposed laws are to be similar to those now in force in California. The following strong committee has been requested to draw up such a law to be presented to the legislative bodies in the West: Governor George P. Pardee, of California; Senator Fred. T. Dubois, of Idaho; Senator R. M. LaFollette, of Wisconsin; Governor Folk, of Missouri, and Congressman E. W. Martin, of South Dakota.

At the Denver Mint, the coinage of subsidiary silver has commenced in order to relieve the scarcity existing.

It is reported that a syndicate has secured an option on the Denver, Lakewood & Golden Railroad, and are figuring on extending that line up Mount Vernon cañon to Idaho springs, thence up Clear creek to Georgetown, and the Argentine district.

Duluth. Aug. 27

Mine-tax values all over the Lake Superior region have been materially raised this year; Michigan's State board is now at work and is playing havoc with both iron and copper mines. In that State valuations are supposed to be upon actual cash values and the raise has not been completed. In Minnesota the tax board of St. Louis county has just filed its report, which shows increased valuations amounting to $20,000,000, making the total assessed values upon which taxes are paid $60,998,341. Mines valued at more than $1,000,000 each are assessed as follows: Oliver Iron Mining Company: Fayal, $3,386,250; Adams, $2,596,126; Spruce, $1,144,000; Mountain, $6,546,750; Burt-Pool, $3,386,250; Monroe-Tener, $1,354,500; Morris, $3,386,250; Hull-Rust, $3,950,625; Pioneer, $1,467,375. Mahoning Ore and Steel Company, Mahoning mine, $2,821,875. Corrigan, McKinney & Co. Stevenson mine, $1,128,750. Tod, Stambaugh & Co., Biwabik mine, $1,693,125. There are no other mines assessed for more than $1,000,000 each, though several independent companies have combined valuations on their several mines amounting to more than that sum. Among these are the Jones & Laughlin mines, with a gross assessment of $1,305,187; Shenango Furnace Company, $1,215,288; Republic Iron and Steel Company, $947,649; Pickands, Mather & Co. (including Cypress), $3,086,887. The entire Mesabi range, so far as it is included in St. Louis county, is assessed at $57,179, 427 and the Vermillion range, also in St. Louis county, at $3,803,887. On this latter range there is no mine assessment outside of St. Louis county, except that of Section 30, which is now in the hands of the Midland Steel Company. On the Mesabi range there is a very considerable value outside of this county in the newer lands held chiefly by the Oliver and Great Northern interests on what is known as the leaner, sandy portions of the range. Assessments have not yet been fixed.

The demand for ore and the slight improvement in shipments over 1905 will have a tendency to push equipment orders for next year, and by so much to continue the buying of material on a large scale. Many new mines must be opened for the coming spring; many large orders for stripping shovels, locomotives and other equipment both for surface and underground must be given. There must be more improvements to lower lake receiving docks, in addition to the two or three that have come in this season. Two of the roads, and those two the largest shippers, are in the market now for 2500 steel cars, and will probably place their orders within a week. They are also after about 20 road locomotives of large size and great power. There may be a new ore-shipping pier or two. The new pier of the Duluth, Missabe & Northern road will be ready for partial use in about two weeks. It will be of very large shipping capacity, on account of its great hight and the ease of moving ore through it.

Owing to the irregularity of boat arrivals at Escanaba and to recent wet weather, ore shipments there are dragging and unless the remainder of the month surpasses the earlier period, August will show a slight diminution from the preceding month. The Northwestern road has hauled to its docks there about 120,000 tons less than for the corresponding period of last year.

Calumet, Mich. Aug. 25.

Labor strikes in the Lake Superior copper district are at an end. The employees at the Quincy mine returned to work a few days ago, accepting the terms offered by the company, and the property is now making a normal production. The mine was idle three weeks, which means a loss of 1,000,000 lb. in the year's output.

At the Adventure Consolidated mine, in Ontonagon county, operations were resumed after an idleness of one week caused by the strike of some of the trammers. Men were secured to fill the places of the strikers and the mine is producing as usual, though with a slightly reduced working force. At the Michigan mine the production is nearly normal, and the force is being increased steadily. It is the expectation of the management that all the men needed will be available within a few weeks. The Mass mine was not troubled, and work has continued without interruption. The Victoria was affected in a slight degree, but operations have not been retarded.

Work has been discontinued at the property of the Erie-Ontario Development Company, a few miles south of the Champion mine, owing to the exhaustion of funds. There is $10,650 due the company from shareholders who failed to pay the last assessment of $5 a share. It is expected that the Erie-Ontario will resume work as soon as it obtains funds.

At a meeting of the board of directors of the Keweenaw Copper Company in the Lake district this week the reports of the development work accomplished were received and discussed. All the directors were present with the exception of Spencer R. Hill, of New York. The directors, including Thomas F. Cole, of Duluth, John D. Ryan, of Butte, C. A. Wright, of

Hancock, J. N. Wright, of Detroit, and Capt. James Hoatson, of Calumet, went from Calumet to the scene of operations in Keweenaw county by automobile. Captain Thomas Hoatson, of Calumet, mining director, and C. A. Wright, Jr., of New York, secretary and treasurer, accompanied the party.

The Hancock Consolidated is progressing favorably with the work of unwatering its 1000-ft. shaft on the Hancock lode. As soon as it is completed a large number of men will be put to work underground and production started. Thos. F. Cole, John D. Ryan, and the St. Mary's Mineral Land Company own 60,000 of the 100,000 shares of capital stock.

Operations in Nos. 1 and 2 shafts of the Tamarack mine, which have been idle since the fire started underground last January, will be resumed in September. Timbermen are at work repairing No. 2. There is very little gas in the mine now, and large fans are operated at the mouths of the shafts to create a strong draft. The Tamarack is now producing one-half of its usual amount of copper, but the output will reach former figures after Nos. 1 and 2 shafts are in commission. Owing to the scarcity of labor, however, it may take some time to reach the full operating capacity.

Platteville, Wis. Aug. 25.

The directors of the Peacock are asking for prices on a compressor plant. It is proposed to enlarge the present engine room so as to accommodate the contemplated engine and compressor. It is reported that the ore is showing up well, and that a mill will be erected some time this fall.

The frame work on the mill building for the Hazel Patch is up, and shows a new construction as far as this field is concerned. The crusher is to be set over a large hopper and the ore is to be fed from there to the rolls automatically. There is considerable speculation as to the ability of the new style of jigs to make a close separation of zinc and lead. It is necessary to get the lead in the zinc down to less than 2 per cent. in order to escape a penalty imposed by the buyers.

A shaft is being put down by the West Main street people to get the large body of lead that is supposed to be located on the Stevens property, in one of the finest residence streets in the city of Platteville. The drill cuttings showed very rich in lead.

The shaft at the Koh-i-noor is down 124 ft. and the water has become so strong that it will be necessary to install a 15-in. lift pump, with which it is expected to sink the shaft 160 ft. without difficulty.

The Sally Waters mine in the New Diggings camp is to be worked. The work of changing to steam power will be pushed to completion. The Sally is one of the old-timers that was worked for lead and chunk ore only; the wash dirt was never handled, and there is estimated that there are thousands of tons broken and ready for treatment in the mill.

The Pittsburg-Benton Company has given the Galena Iron Works the contract for a 75-ton concentrating mill, including a power plant.

There is some likelihood that one of the larger concerns, operating in the district will purchase a Davis-Calyx drill for use locally, with which, it is claimed, it will be possible to obtain a much better record than with any other apparatus, as it will give a good core and at the same time the cuttings can be saved.

The New Preston Point concentrating plant has been started and it is expected that the first ore will be shipped next month.

Unless water is obtained shortly at the Milwaukee-Highland mine, it will be impossible to start the mill cleaning ore. It is understood that a new contractor will endeavor to get a hole down to the water-level. Owing to the shelly character of the ground it is quite a difficulty to drill with a churn drill.

Preparation is being made to restore the foundations of the Franklin mill that were somewhat injured through the settling of the ground under the mill, caused by the roof of one of the drifts giving way.

Scranton. Aug. 27.

Despite the efforts to combat it, according to statements made, the United Mine Workers are losing their membership, and, if the desertions continue, there will be only a few hundred in each district at the end of the year. The trouble is due to the fact that the men do not believe an organization is needed at this time. The officials of the organization are striving to keep the men in the ranks, but the only thing that can do that is a personal trip through here of President John Mitchell. It will be necessary for him to give the anthracite region his earnest attention before long.

A new collection plan will be inaugurated by the officials of the mine workers' organization, this month, when men appointed to the task will collect the dues of members at the pay car. Heretofore, it has been necessary to find the man who owed dues.

Officials of the United Mine Workers met in Wilkes-Barre, during the week, to confer on the advisibility of prosecuting all cases wherein there is a violation of the mine certificate law. The State Supreme Court recently handed down an opinion in which it decided that law was Constitutional. The officials had expected that the Delaware & Hudson Company, which was both the prosecutor and defendant in the case, would take the case to the United States Courts, but this has not yet been done. Unless it is, and the constitutionality of the act is further questioned, the mine workers' union will try to punish all violations.

At a convention of the miners of sub-district, No. 1, which is a part of district No. 7, resolutions were adopted in which the national executive board is petitioned to allow the organization of the sub-district as a separate district.

London. Aug. 18.

A few weeks back I mentioned that there was the probability of a law suit between the Salt Union and Brunner, Mond & Co., relative to the alleged extraction of brine by the latter's pumps from land belonging to the former. This action was heard last week before the Lord Chief Justice, who decided in favor of Brunner, Mond & Co. The case was a complicated one and for a thorough understanding of it, some history has to be studied. But, briefly, the Salt Union claimed that, though Brunner, Mond's pumps were on their own land, the wells belonging to the two parties had been connected by an underground channels in days gone by, and that the flow of water through the strata was from the Salt Union land to Brunner, Mond's; therefore it was the Salt Union's brine that was being pumped by Brunner, Mond & Co. A further argument was that Brunner, Mond were, by this method of solution, actually raising a solid mineral, rock salt, from the Salt Union's deposits. This was a very ingenious plea, for, though by law a person may rise unlimited water from his own land though coming from his neighbor's land, yet he was liable to damages if he extracted any solid deposit from his neighbor's land. However, the weight of geological opinion went to disprove the contention that the current of underground water passed directly from the Salt Union's salt deposits to Brunner, Mond's pumps. In fact, it was shown that the Cheshire salt deposit was distributed evenly over a basin 25 miles long by 9 miles wide, and that there were no special currents in the underground waters which dissolved the salt. The judge's decision was based on this evidence and it may therefore be said that the law of brine and the law of water are now identical.

The results at the Dolcoath tin mine in Cornwall for the first six months of the year are, as might be expected, the most favorable since the mine was turned into a limited company 10 years ago. The amount of ore milled, the product per ton, and the price obtained all show an increase, with the total costs remaining stationary. The ore crushed was 49,934 long tons, an increase of 1462 tons over the second half of 1905; the black tin sold was 920 tons as compared with 866 tons; the produce of black tin per ton of ore was 41.28 lb. as compared with 40.06 lb.; and the price of black tin was £105. 13s. 4 d. as compared with £91 17s 11d. The total income was £97,910 as compared with £79,733, while the working costs, includ-

ing lord's royalty, were £57,744 as compared with £57,076. A net profit was left of £22,385. Out of this, £9482 has been written off for depreciation and £24,296 has been distributed as dividends, being at the rate of 15 per cent. per annum. Developments at the mine continue to be promising, the costs of winning are decreasing and the percentage of extraction is increasing, so that altogether the immediate prospects of the company are very bright. In spite of its critics and detractors, Dolcoath remains one of the wonderful and interesting mines of the world.

Important departures are being made by the Fremantle Smelter, Ltd., owning the smelter at Fremantle, Western Australia, a company belonging to the Kaufman, or Golden Horse Shoe group. Up to the present time is has subsisted chiefly on lead concentrates from eastern Australia, and gold ores from Kalgoorlie, etc. These supplies have recently tended to give out, and the furnaces have been working short time. It is now intended to alter one of the furnaces to treat copper, and to erect a tin smelter. The company also intends to develop lands in the Northampton district of Western Australia where lead deposits occur. Before long, therefore, the company should be full of work.

General Mining News.

ALASKA.

Daniel Guggenheim, of New York, who has been spending some weeks inspecting his mining properties in Alaska, announces that the Guggenheim interests will build a railroad into the Copper river valley to develop the mines there. It is understood that the ores from these mines will be shipped regularly to the new smelter now being erected at Point San Bruno on San Francisco bay, in California, which is controlled by the Guggenheim interests.

CALIFORNIA.

AMADOR COUNTY.

Mitchell Mining Company—At this mine, Pine Grove, 10 stamps of the mill are steadily operating, but the ore varies in character and has to be sorted.

BUTTE COUNTY.

Edel—This mine, near Enterprise, A. Del Mar superintendent, has temporarily closed down in order that the capacity of the mill may be doubled. Air compressors are also to be installed.

CALAVERAS COUNTY.

Lucas—In this mine an 8-ft. vein has been exposed carrying free gold and some sulphurets. A mill is being operated in this ore.

FRESNO COUNTY.

Florence Mack Cinnabar Mine—At this mine, six men are taking out cinnabar ore and piling it up for future shipment. There is a good wagon road to the mine.

HUMBOLDT COUNTY.

Big Bar—This property, at Orleans, has been leased for six years by Waldner & Buhne to Wm. Salsburg. The lease is given with the understanding that the owners may sell the claim at any time by making suitable compensation to the lessee.

INYO COUNTY.

Sanger and Mairs Groups—These two copper groups have been sold to New York men on a basis of about $200,000 for the two. The Sanger and Mairs groups are northeast of Owens lake in the Cerro Gordo country, in what is locally styled the Ubehebe copper belt. The Hunter and Spear copper claims are on the same belt, which parallels the Inyo range.

Black Cañon Gold Mining Company—At this property the road up the cañon has been put in good condition, a camp of requisite size established on the grounds, necessary tools and appliances purchased and installed, and work in development is being prosecuted. The ore encountered and extracted from the several ledges shows increasing values.

LAKE COUNTY.

Helen—At this quicksilver mine, near Middletown, A. Rocca has men and teams at work preparing the ground and placing necessary materials at hand with which to build a large furnace.

NEVADA COUNTY.

Nevada Drift Mine—At this mine, at Red Dog, Jerry S. Goodwin and associates will soon be ready to begin drifting. Last year they put up a hoisting and pumping plant on the old blue lead that extends toward You Bet and sank a shaft. They are now in rich gravel, and as it is cemented, they contemplate building a stamp mill to crush it.

Ocean Star—An important strike has been made in this mine at Ormonde, owned by M. D. Cooley and under bond to A. Maltman and others. A few months ago Mr. Maltman put men at work there extending the crosscut ahead to tap the ledge and this was accomplished a few days ago. There is now exposed, 180 ft. below the old workings, a fine looking vein 4 ft. in width.

California—This company has recommenced operations at Deadman's Flat and within a month expects to be busy pumping out the shaft preparatory to active mining. The mine has been closed for 15 years, but Eastern men have now taken hold of it.

Gold Mound—This Spokane company has purchased from Wm. George and others the Boyle & Roach placer mine, the Gold Cup, the 1903, the West Virginia and Lucky Boy quartz mines adjoining the Baltic placer mine and the Sunflower mines near Grass Valley.

RIVERSIDE COUNTY.

Virginia & Indian Queen—The mill and buildings on this property at Perris were destroyed by fire last week. A brush fire, burning over several thousand of acres, was the cause.

COLORADO.

EAGLE COUNTY.

Gypsum—A body of hematite iron ore was found recently on this claim three miles north of the Denver & Rio Grande tracks in this county. A hole was put down about 10 ft., and two small streaks were found in the mass that run high in gold; the mass of iron runs from 50 to 60 per cent. iron. The owner will ship during the week a carload to the smelter at Leadville, to test the merits of the discovery.

LAKE COUNTY—LEADVILLE.

Little Jonny—There are 73 sets of lessees on this property employing 350 men, and shipping an average of 7000 tons per month. Some of the ore is high grade, while the bulk of it is away above the average grade of ore shipped from the camp. The output is curtailed on account of the scarcity of railroad cars.

Holy Cross District—The cross-cut tunnel driven by the French Mountain Mining Company has reached a distance of 2700 ft., and still has 30 ft. to go before the Grand Trunk vein is caught. The company is also sinking a new three-compartment shaft, which is down 80 ft., and will go 600 ft. to connect with the tunnel. By September the cyanide mill will be started; on the dump are 3000 tons of ore as a starter for the mill.

Aetna Shaft—This shaft, Lower Carbonate hill, is down 220 ft., and will be sunk another 130 ft., when it is expected that the parting quartzite will be encountered at that depth. No trouble is being experienced from water.

Coronado—From this property a trainload of ore is being sent to the smelter daily, the bulk of it coming from the lower levels. The long drift on this property is now opened from Second to Tenth streets and the ore-shoot has been found the entire length. The heavy flow of water is letting up, as the pumps are now lifting only 1700 gal. per minute against 2500 when the ground was first opened.

Sedalia—At this mine, on Big Evans gulch, during the week, in one of the old stopes, a body of ore about 9 ft. wide, was opened running in the neighborhood of $20 per ton.

Miller Group—The stamp mill on this property, Lackawanna gulch, will be started during the week, and will be kept running steadily on low-grade ore. The high-grade ore which runs high in gold is being sacked. The claims are all above timber-line and all of the ore is packed down to the mill.

Expansion—At this mine, St. Kevin

district, from the 100 ft. level drifting has been started, and a large body of low-grade ore has been opened, which is a good milling proposition.

Leopard—Dwyer & Co., leasing on this claim, Ball mountain, opened during the week an 18-in. vein of ore that will run $100 per ton; the ore was found in the shaft at a depth of 130 ft. A plant of machinery will be installed and the shaft sunk deeper. The property is 500 ft. east of the Sunday.

SUMMIT COUNTY.

Blue Flag—This company, now operating the Laurium mine on Bald mountain, has about completed the addition to its mill, which will be in operation within the next 10 days. J. F. Eisman, president of the company, has been up from Denver looking over the property.

Bay State—This company is operating on North Star mountain under the management of Arthur Howard. A strike of high-grade copper-gold ore was made, recently. A new tunnel is being started into the mountain to cut this ledge at a depth.

Nebraska—A new corporation, formed by Mr. B. B. Green of Nebraska capitalists, is operating a group of claims on the east side of the North Star mountain, not far from the Atlantic.

Atlantic—This mine is making regular shipments of gold ore to the Denver smelters.

Frisco—This camp is unusually active, just now, and not only the new ventures, but also the old companies, which have for sometime been indifferent in their operation, are making the camp lively.

King Solomon—This company is operating steadily, pushing ahead the main tunnel into Mt. Royal with machine drills. The management is securing more territory, this including some well-located ground over by Miner's creek.

Mint—This company, which is operating in Ophir mountain, by tunnel, has a force of men working two shifts. The breast of this adit is now in solid formation; and a good ledge of ore was lately passed through.

Heckman's Eureka — This property, which lies below the Victoria mine on Royal mountain, has produced some rich float. A tunnel, 260 ft. long, has been run through the wash by the owners, Heckman & Linquist, and they are now coming into the solid formation which shows the characteristics schist of the mountain.

Denver—The property, to the east of the Victoria, which was worked for a long time by Albert Newton, has been taken over by a Denver company, with Mr. Colburn at the head of affairs.

Square Deal—This company has established an excellent camp at the foot of Chief mountain, up North Ten-Mile cañon. There is a natural water supply rising in a near-by gulch, piped all through the camp for all purposes. The work is confined to driving the main development tunnel into the base of the mountain. This tunnel is now in 125 ft., and is in good formation.

Mary Verna—This company's main tunnel is now in 1105 ft., and the formation is showing a distinct change for the better. A sprinkling of copper and iron pyrites is coming into the rock.

Boltz Property—This property, on Peak 1, has been signed over under bond and lease, to the Southwestern Brokerage and Investment Company, of Memphis, Tennessee.

Slate Creek—Martin Hartman, an old-time prospector and miner of Summit county, has located some valuable property on Slate creek, 20 miles below Dillon. He claims to have an outcrop several feet wide, carrying gold and silver; the rock is heavy in iron, making it a suitable ore for smelting.

TELLER COUNTY—CRIPPLE CREEK.

Drainage Tunnel—Articles of incorporation have been filed by the Cripple Creek Drainage and Tunnel Company. The capital stock of the company is 1,000,000 shares of $1 each. This is the long-talked-of deep drainage tunnel, and it is understood that work will be commenced on the big bore in a few months. The location of the new adit will be the one known as the Gatch Park tunnel, which will drain the district at about 700 ft. below the present drainage tunnel. The directors for the first year are as follows: Sherwood Aldrich, F. G. Peck, Frank Costello, F. G. Campbell, S. S. Bernard, C. C. Hamlin, J. T. Milliken, A. E. Carleton and W. J. Chinn. The stock of the company will be subscribed for by the different mining companies whose property will be benefited by the construction of the tunnel, and it is understood that work will not be commenced until $750,000 has been subscribed. The tunnel, as now projected, is the one known as the intermediate tunnel, and will drain the district at about 350 ft. above the level proposed by the Window-in-the-Rock plan. It will also be about 2600 ft. shorter.

Isabella—The construction of the mill on this property goes on in good order. It is understood that the company has bought the tanks formerly used at the Los Angeles mill.

Bill Nye—Good shipments have been made from this property, situated on Copper mountain and adjoining the Fluorine claim on that hill, which in the past has produced a large amount of ore. The Bill Nye is being operated by Richard Blanchard and associates.

South Burns—The output from this recent strike still continues to be good. A large amount of ore has been shipped from this property in the past few weeks. The lease is being operated by the Standard Mining and Development Company.

Columbia—A rich strike is reported on the Chicken Hawk property operated by this company under lease. The company has the extension of the Mary McKinney and Aileen viens, and a large amount of ore has been extracted. A new ore-house is being built. Mr. Chas. Walden is in charge of the property.

GEORGIA.

LUMPKIN COUNTY.

Etowah Gold Mining and Ditch Company—This company has been organized to develop some old gold mining properties near Auraria. J. W. McIntosh, Kansas City, Mo., is president; L. L. Bettys, Auravia, Ga., engineer in charge.

IDAHO.

BLAINE COUNTY.

Carbonate Hill—This company has made a strike of good lead ore on its property on Cherry creek, near Galena. The strike was made in the tunnel, which is now in 1700 ft. The vertical depth is 900 ft. The vein dips at an angle of 45 deg., and is about 2 ft. wide where cut.

Quincy Junior—This company, composed of Salt Lake people, has bought the old Red Elephant group in the Bullion district, and is developing it on a considerable scale. The officers of the company are H. P. Henderson, president; W. W. Armstrong, treasurer, and W. A. Wilson, consulting engineer.

INDIANA.

Leases for about 15,000 acres of land have been filed for record in the new oil-field in Southern Indiana. The land lies in Armstrong and German townships, near Armstrong and South Wendel. For a month or more the oil and gas men have been busy securing leases in Vanderburg and Gibson counties. They work quietly and give out no information other than to file their leases. The McManus Oil Company, a West Virginia corporation, is quite active and has a large block of territory leased. Many rigs are being built, and good average wells in the field are attracting attention. The excitement is growing every day. Real estate values have increased and property owners are expecting to make fortunes out of the oil business in this section.

KENTUCKY.

PIKE COUNTY.

Big Sandy Company—It is stated that the Cincinnati Gas, Coal and Coke Company has contracted to take for 12 years the entire output of the mines now being opened in this company's property in the Elkhorn coalfield. The company is opening 10 mines on its property.

MICHIGAN.

IRON—MENOMINEE RANGE.

It is estimated that about 500 more men are working in the Iron River-Stambaugh

district of the Menominee range than last year. The present force is about 1200, of which the Verona Mining Company (Pickands, Mather & Co.) employs about half. Further increases are looked for as new properties get to the mining stage.

Maas—Extensive buildings are to be erected at Maas mine, Negaunee, by the Cleveland Cliffs Company, including a dry-house to have capacity for 225 men, large engine and boiler houses, etc. This mine is now employing a larger force than at any time in its history, about 110 men. The shaft is 110 ft. deep, and drifts are progressing on the 700 and 900-ft. levels. A large steel shaft-house will be constructed at this mine, and every preparation made for great shipments as soon as the mine can develop sufficient ore reserves. It is about four years since work began at this mine, and it will be at least another season before it can be an important shipper. It took 22 months to sink the shaft to ledge, and it was one of the most severe undertakings ever planned for the Lake region.

HOUGHTON COUNTY—COPPER.

Caldwell—Exploration on this property, located between the Tecumseh and Rhode Island, has been started with a diamond drill. It is controlled by the Calumet & Hecla. At a recent meeting of the directors the following officers were elected: President, R. R. Goodell; vice-president, R. Skiff Sheldon; secretary and treasurer, Courtney C. Douglas, all being Houghton men. The Caldwell comprises 560 acres. The company has a capital, authorized, of $2,500,000, divided into 100,000 shares. A little less than 50 per cent. was issued to the original land-owners in exchange for the property, and the Calumet & Hecla took slightly less than 50 per cent., paying cash therefor. The remainder of the capital stock, which is held in the treasury, is under option to the Calumet & Hecla, and if the latter purchases it, it will have the controlling interest.

Isle Royale—Preparations are being made to ship an increased tonnage of rock from the shaft on Section 11. The rock-house is being enlarged and additional facilities provided. The results secured from this shaft are very encouraging.

Osceola Consolidated—It is understood that the engineers have definitely decided upon the site for the proposed new shaft at the North Kearsarge branch, to be known as No. 4. Drifts will be extended northward on 14 levels of No. 3, to intercept the strike-line of the new shaft, which will permit sinking from those points simultaneously with sinking from the surface. There have been extended diamond drill explorations conducted in the upper levels south of No. 3 and much profitable ground, heretofore neglected, has been revealed. The showing in the drifts north from No. 3 is very encouraging.

Superior—At the fourth level of No. 1 shaft the Baltic lode is exceptionally rich in copper. The south drift at that level is now in a distance of 40 ft. This drift is 7x7 ft. and is breasted in a face of solid copper rock, containing a large amount of mass and barrel work. The south drift is being driven toward shaft No. 2 that was recently started.

MINNESOTA.

IRON—MESABI RANGE.

Genoa—This company is sinking a large shaft on the edge of the village of Sparta, Mesabi range, for the purpose of taking out what ore has been developed beneath the village. This is a large tonnage and the company will be mining there a number of years. The shaft is now 250 ft. deep and is in rock, so that it will be a year before the actual mining of ore will be undertaken, as a lot of drifting must be done from the 375-ft. level before the orebody is reached. The shaft is vertical and three-compartment. Engine and boiler houses and a large brick stack, all of the standard type adopted by the Oliver Iron Company, are under way. No move has been made looking toward the removal of the village of Sparta, but it will probably be started late in 1907, making this the fourth town in the range that has been bodily removed on account of the finding of large ore deposits beneath it subsequent to the location of the town. The fifth such town will be Hibbing, a large part of which is now known to be underlain by iron ore belonging to the Oliver company.

Gilbert—The Oliver company's Gilbert mine, a property formerly belonging to the Higgins lands and lying in section 24—58—17, between the Sparta and the Pettit, is to be opened at once, and will be a shipper another year. It is probably a large deposit.

Vermillion Pine, Iron and Land Company—Lands of this company lying in the NE. part of T 58—15, which are east and south of the developed parts of the Mesabi, are to be explored by deep drilling by Cole & McDonald, of Virginia, for the owner. It is expected that ore will be found thereon.

MONTANA.

SILVERBOW COUNTY.

Anaconda—The Mountain Consolidated and Clear Grit mines were closed down Aug. 21, in order that the shaft on the former might be repaired. A month or six weeks will be required to do the work. The Mountain Consolidated yields between 400 and 500 tons of copper ore a day and the Clear Grit 1500 tons a month. The latter is worked through the former, which is the reason for closing it. The decision to close was sudden, resulting from the breaking of a portion of the engine-bed of the Mountain Consolidated. Other mines of the company will yield enough ore to make up the deficiency while the work of repair is in progress. The shaft is 2100 ft. deep and has been giving the company some trouble recently.

Boston & Montana—Low water in the Missouri river has caused the company to use both water and steam power. On Aug. 1 it began using 3000-h.p. steam and all the water it could secure, and was then short. It expects to be 200 h.p. short by the last of the month. The company is treating 3000 tons of second-class ore and 700 first-class. The plant having been designed for 2000 tons with 1000 at the beginning; increasing to 2000 and then to 4000, the company is having trouble in arranging for the purposed increase to 5000 tons. It will have to rearrange the larger part of the works. Its Mountain View mine will begin yielding an increase of from 400 to 500 tons this week, all repairs and changes at it having been about finished.

Lewisohn General Development—This company has struck copper ore in two places on the Montgomery on the east side, the vein being the one which traverses the Maggie, Bullwhacker and Bertha farther north. The vein is practically new and has a north and south course. The ore above water is a silicate, and averages about 4 per cent. copper. It has not been tapped below water. On the Bullwhacker, at a depth of 50 ft., it has been crosscut 60 ft., with only one wall in sight. The same ore found in the vein has been found above water on the west side, and below water it was sulphide. The Lewisohn Company has the Montgomery and other claims under bond.

Davis-Daly—The crosscut from the 1800-ft. station of the Original, driving for the purpose of cutting veins traversing Davis-Daly ground, is 530 ft. long, 220 of which has been driven since the Original took the contract to make the opening. No veins have been cut. The company has begun raising water from one of its three shafts. Each shaft has been supplied with a boiler of 200 h.p. and a new hoisting engine.

Coalition—Great headway in the development of this property is reported. The shaft on the Corra is going down rapidly and new territory in the lower levels of the Rarus is yielding ore of better quality than that mined in the upper openings. Shipments aggregate about 1200 tons a day, but they will be increased several hundred tons.

NEVADA.

LINCOLN COUNTY.

Ohio & Kentucky—This company will soon begin operations at Pioche. It owns some of the oldest producing mines in that district.

NYE COUNTY.

Ore Shipments—Shipments over the Tonopah Railroad for the week ending

Aug. 16 were: Tonopah, 2480 tons; Goldfield, 1432; Lone Mountain, 30; total, 3942 tons. The shipments from Tonopah in detail were: Tonopah Company, 1300 tons; Tonopah Extension, 650; Belmont, 240; Midway, 100; Montana-Tonopah, 150; West End, 40; total, 2480 tons.

WHITE PINE COUNTY.

Nevada Consolidated — Announcement has been made that the new railroad will be finished to Ely, Nevada, about Sept. 10. The smelter to be erected by this company will be at Duck Creek, about 12 miles from Ely, where the company has acquired valuable water-rights.

PENNSYLVANIA.

ANTHRACITE COAL.

Vulcan Colliery—Two men were killed and twenty others injured by an explosion in the Vulcan Colliery of the Mill Creek Coal Company, at Mahanoy City, last week. The explosion occurred in the fifth and sixth lift of the shaft and was due to a naked light.

Warrior Run Colliery—The fire which started in the Warrior Run mine of the Lehigh Valley Coal Company, is still burning, though the company has resorted to every known means to control it. Thousands of gallons of water have been poured on the fire for weeks, but it only seemed to spread it. It is probable the company will wall the fire in, thus confining it to as small an area as is possible.

Delaware & Hudson—A new shaft is being sunk by this company in Pittston. It will be used to flush culm into the abandoned workings of several collieries adjacent.

Landmesser Tract—This tract, including 50 acres of coal land in or about Wilkes-Barre, has been sold by the Landmesser heirs to A. I. Williams, of that place; John N. Thomas, of Pittston, and Morris Williams, of Philadelphia, the latter being general manager of the Susquehanna Coal Company. The consideration was something like $200,000.

Lehigh Coal and Navigation—This company, which owns 45,000 acres of land in the Pocono mountains, is said to be going to reforest on a large scale. The plantings will be seedlings of various varieties, white pine to predominate. The plans of the company contemplate the erection of a nursery to raise the seedlings.

Schuylkill Coal and Iron Company—Negotiations are pending on the part of this company for the purchase of a number of coal tracts between Tamaqua and Lykens. This company has already bought up coal lands valued at several millions of dollars and plans are being prepared for at least half a dozen openings in the spring. It is said this company has more than once paid as high as $2000 an acre for valuable coal lands in similar deals.

BITUMINOUS COAL.

Pennsylvania, Beach Creek & Eastern—This company, recently organized, has an authorized capital of $5,000,000 stock, and will issue $3,000,000 bonds, of which $1,200,000 have been sold. The directors are W. A. Lathrop and Robert Mitchell, Philadelphia; James Kerr, Clearfield, Penn.; T. H. Watkins and Clarence D. Simpson, Scranton, Penn.; A. G. Palmer, Portchester, N. Y.; R. H. Williams and Samuel T. Peters, New York; Richard C. Storey, Boston. The new company has leased the properties of the following operating companies: Pennsylvania, Beech Creek, Webster, Chest Creek and Gallitzin; these including various subsidiary railroad and shipping concerns. The company has, in fact, taken all of the coal properties in the Beech Creek and Clearfield districts, controlled by the New York Central & Hudson River Railroad Company; the object evidently being to divest the railroad company of its ownership in coal mining and selling companies.

Richards-Magee Coke Company—This company now controls the management of several coke companies—the Southern Connellsville, the Masontown, the Whye, and the Lockrone—all operating in the Southern Connellsville, or Masontown field. These companies have 602 coke ovens now in operation, with 300 more building. The office of the company is in Pittsburg; the officers are: President and treasurer, W. C. Magee; vice-president, C. P. Wheeler; secretary, S. H. Waddell.

UTAH.

BEAVER COUNTY.

Pine Grove—The new mill of this company is about ready for commission and will treat 40 tons per day. It is in the Pine Grove district.

IRON COUNTY.

Jenny—This company is developing some extensive bodies of mill ore at its property at Goldsprings. On the 100 level the ledge is 15 ft. wide. In it are streaks of shipping ore.

SALT LAKE COUNTY.

New England Gold and Copper—This company is making good headway with the development of its Bingham mine. The new compressor plant is now in operation and the mill is running steadily.

Consolidated Flagstaff—This Alta company has been pushing development steadily; but on account of a scarcity of teams, has been handicapped in moving ore to the smelters.

SUMMIT COUNTY.

Park City Ore Shipments—Last week these were 3,993,840 lb.; the contributing mines being: Silver King, 993,840; Daly-West, 800,000; Little Bell, 470,000; Daly-Judge, 1,626,000; Crescent, 55,000; Kearns-Keith, 49,000 pounds.

Ontario—The management has expressed the opinion that the drain tunnel will be open again within 60 days. A crosscut is being run from the drift, run parallel to and 140 ft. from the caved section of the adit.

WEST VIRGINIA

Chief Mine Inspector James W. Paul announces the appointment of Wm. Warner as a district mine Inspector for the State. He has been assigned to duty in the Seventh mining district embracing mines in Mercer and McDowell counties, with headquarters at Welch.

Foreign Mining News.

CANADA.

BRITISH COLUMBIA—VANCOUVER ISLAND.

Tyee Copper Company—This company reports that during July its smelter at Duncans station ran 11 days, and treated 1792 tons of Tyee ore, giving a return, after deduction of freight and refining charges of $31,128; an average of $17.48 per ton.

ONTARIO—COBALT DISTRICT.

Thomas W. Gibson, Deputy Minister of Mines, has returned from a tour of the Cobalt district. He inspected the vein discovered by the exploration party under Prof. W. G. Miller in the Gillies timber limit and expresses the opinion that the deposit is one which promises well and ranks among the best so far discovered in the Cobalt region. Tenders have been asked for sinking a shaft 75 ft. deep for developing the property, and buildings are in course of erection for the accommodation of the force at work, which now numbers 30. Mr. Gibson considers that indications point toward the discovery of another good vein in the locality. An important discovery is reported on a Cobalt claim adjoining the Gillies limit, where free-milling gold is said to have been found at a depth of 54 ft. A 6-in. vein has been exposed for 250 ft. The formation of this locality is identical with that of portions of the Gillies timber limit.

Kerr Lake Mining Company—Rich antimonide of silver has been found on this company's Cobalt location, generally known as the Jacobs property.

Trout Lake—In sinking a shaft on their claim at Trout lake, in the Temagami forest reserve, McKenzie & Philbrick struck a vein of nicolite at the depth of 54 ft., assaying $1100 to the ton. Afterward, when drifting this vein, they exposed a vein of native silver. This is the most important find recently made in silver-bearing ore.

QUEBEC.

Chibogamoo Gold and Asbestos Company—This is the only company in the Chibogamoo area which has, so far, undertaken actual development work. It has made some open cuttings and commenced a shaft. Ore from the open cuttings was found to average $11 in gold and about $50 in copper per ton. The yield from the shaft was richer, being $24 gold and

$56 in copper. A 12-ft. vein of nickeliferous pyrrhotite has been opened up. Magnetic iron ore has also been found on the properties of the company, some of it containing 75 per cent. of iron.

MEXICO.

CHIHUAHUA.

There is considerable activity in the section surrounding San Pedro.

Candelaria—This company is having much success in drilling the openings required to unwater the mine by the air-lift process. In making these shafts an 18-in. shot drill is used, supplemented by a churn drill when short, broken ground is encountered. N. C. Thompson is manager.

Sierra Madre—This company is preparing to put in a 100-ton concentrating plant.

Ysabelita—At this mine a shipping proposition has been opened up, the ore running well in gold, silver and lead. The property is owned by Connecticut people; L. E. McBain is superintendent.

Coal Trade Review.

NEW YORK, Aug. 29.

In the Western coal trade Lake shipments have improved, but local business is still embarrassed by short supply of railroad cars. There is, however, no serious complaint of scarcity of coal at consuming points.

In the East the markets are quiet everywhere, and business is dull. New England consumers seem to be slow about putting in supplies, and the coastwise trade is inactive.

COAL TRAFFIC NOTES.

The coal and coke traffic originating on all the lines of the Pennsylvania Railroad east of Pittsburg and Erie, for the year to Aug. 18, was as follows, in short tons:

	1905.	1906.	Changes.
Anthracite	2,921,581	2,688,105	D. 233,476
Bituminous	17,908,925	19,668,386	I. 1,759,461
Coke	6,892,827	7,924,861	I. 1,032,034
Total	27,723,333	30,281,352	I. 2,558,019

Shipments of Broad Top coal over the Huntingdon & Broad Top Railroad for the week ending Aug. 25 were 12,339 tons; for the year to Aug. 25 they were 491,634 tons.

Receipts and shipments of coal at Lake ports for the season to June 30 are reported by the Bureau of Statistics as follows, in short tons:

	1905.	1906.	Changes.
Shipments	4,614,000	5,086,315	I. 472,315
Receipts	3,829,620	4,300,085	I. 470,465

Shipments include coal for the use of steamers, which was 592,327 tons in 1905, and 589,516 tons in 1906; a decrease of 2811 tons. The remaining difference between receipts and shipments is accounted for by coal going to Canadian ports.

The coal tonnage of the Baltimore & Ohio Railroad for the six months ending June 30 is reported as follows:

	1905.	1906.	Changes.
Anthracite	546,434	427,035	D. 119,399
Bituminous	10,713,489	12,383,784	I. 1,670,295
Coke	2,230,535	2,890,962	I. 660,427
Total	13,490,458	15,701,781	I. 2,211,323

The total increase shown over last year was 16.4 per cent.

Coal and coke tonnage of the Norfolk & Western Railroad for the six months ending June 30 was, in short tons:

	Coal.	Coke.	Total.
Tidewater	1,725,666	94,773	1,820,439
Line points	4,088,202	1,058,519	5,146,721
Total	5,813,868	1,153,292	6,967,160

The total shows an increase over last year of 738,843 tons, or 11.9 per cent.

New York. Aug. 29.

ANTHRACITE.

The hard-coal market even yet shows no awakening. Certain of the free-burning coals are slightly more favored than others, particularly in the fine sizes, but the opportunity of saving 10c. per ton has passed unnoticed. Prices within the coming week will advance to their winter level; until Saturday they remain at $4.65 for broken and $4.90 for egg, stove and chestnut. Steam sizes remain at their regular prices: $3 for pea, $2.25@2.50 for buckwheat, $1.45@1.50 for rice and $1.30@1.35 for barley f.o.b. New York harbor shipping points.

BITUMINOUS.

The soft-coal trade shows an abundant supply of coal with considerable difficulty in disposing of it. Cars are still short, but, in view of low prices and small demand, producers are not loudly complaining.

The far East and the Sound are equally unwilling to take on supplies of coal, even those who are under contract being so well supplied that they are behind in their deliveries. New York harbor has lots of coal and prices are low. Good grades of Pennsylvania coal sell for $2.50@2.60 and West Virginia coals can be had for $2.25@2.40 f.o.b. New York harbor shipping points.

All-rail trade is active along the road to Philadelphia, but in New York and New England this business is as stagnant as at tidewater. Vessels in the coastwise market are in good supply and not actively needed. Philadephia quotes 65c. to Boston, Salem and Portland.

Birmingham. Aug. 27.

Union coal miners, who were out on strike for more than two years at mines belonging to furnace companies in Alabama, are now seeking employment at such places as they can get work, whether it be in closed shop mines or not. This is the result of the vote taken by the various locals belonging to the district organization whether or not the strike should be called off. There are less than 4000 miners to be provided with positions and while it is not improbable that there will be room at a number of the furnace companies, many of the men will hold off from going to work at once.

Chicago. Aug. 27.

The wholesale market for coal continues very dull, except for Eastern coals, which are in good demand and not in over-supply. Car shortage, though much talked of, does not yet affect the market to any extent. Much coal from Illinois and Indiana is still sold on demurrage. Anthracite is hopelessly dull.

Illinois and Indiana bring a little less on fine coals than last month, $1.20@1.50 being the prevailing quotations for screenings, and $1.40@1.75 for run-of-mine product. Smokeless, Hocking and Youghiogheny are still in somewhat scant supply, and prices are firmly upheld.

Cleveland. Aug. 28.

A week ago the coal trade in this territory was congested as far as the lake movement is concerned. By a shift in lake conditions this was relieved in part. A renewal of the ore movement a little later on, and the appearance of new grain, sent boats back into that trade and coal is piling up on the hands of the railroads again.

The car supply has not been at any time, lately, sufficient for the needs of local shippers and the price has risen in consequence. The market is now strong on the basis of $[illegible] at the mines for Ohio and Pennsylvania. Ohio slack is selling at 80c., and Pennsylvania at 75c. at the mines.

Coke is strong. The best grades of 72-hour coke are selling at $3.50 at the oven and furnace coke has sold at $2.95, the range being $2.90@3 at the oven.

Pittsburg. Aug. 26.

Coal—There is no improvement in the car supply and the railroad mines in the Pittsburg district are not being operated to more than 60 per cent. of capacity. The demand keeps up and prices are firm, most of the sales of the week being at the maximum rate of $1.15 a ton for mine-run coal f.o.b. mine. A number of small river shipments were made and all the river mines are in full operation. The Pittsburg Coal Company is rushing most of its production to the lake ports.

Connellsville Coke—There is no apparent car shortage in the Connellsville region, although there was a slight falling off in both production and shipments. Prices are firm and it is likely that a stiff advance will occur. Furnace coke this week is quoted at $2.75@2.80 and foundry at $3@3.15. The production for the week, according to the *Courier*, amounted to 278,220 tons and the shipments aggregated 13,808 cars distributed as follows: To Pittsburg, 4471 cars; to points west of Pittsburg, 7438 cars; to points east of Connellsville, 189 cars. The production in the lower Connellsville region was 107,854 tons.

Foreign Coal Trade.

Aug. 29.

Imports of fuel into France for the half-year ending June 30 were, in metric tons:

	1905.	1906.	Changes.
Coal	4,834,560	7,209,320	I. 2,374 760
Coke	783,190	1,158,250	I. 375,060
Briquets	198,510	267,600	I. 69,090
Total	5,816,260	8,635,170	I. 2,818,910

The more important receipts were from Great Britain and Belgium.

Exports of fuel for the half-year were, in metric tons:

	1905.	1906.	Changes.
Coal	811,940	643,010	D. 168,930
Coke	110,390	80,960	D. 29,430
Briquets	32,230	52,760	I. 20,530
Total	954,560	776,730	D. 177,830

The exports were chiefly to Belgium and Switzerland.

Imports of coal into Spain for the half-year ending June 30 were 1,118,539 metric tons, an increase of 44,978 tons. Imports of coke were 90,612 tons, an increase of 14,054 tons over last year.

Shipments of coal by water from the Newcastle district in New South Wales for the half-year ending June 30 are reported as below, in long tons:

	1905.	1906.	Changes.
To Australian ports	802,884	903,301	I. 100,417
To Foreign ports	676,241	871,060	I. 194,819
Total	1,479,125	1,774,361	I. 295 236

Shipments to New Zealand are included in those to Australian ports.

Iron Trade Review.

New York, Aug. 29.

The rush for pig iron has fallen off a little, but late buyers are still making matters interesting. A general advance in prices has been the result. In finished material business continues to come in, and most mills are full of orders well into next year. August of this year will be long remembered as the most active midsummer month on record. Particulars will be found in our local letters below.

Birmingham. Aug. 27.

Iron, for delivery during the balance of the year, is bringing $16 per ton in the Southern territory and there appears to be a fairly good demand therefor. Iron is being sold for delivery during the first quarter of the coming year at $15.50 per ton, No. 2 foundry. Consumers appear to be in need of a great quantity of iron and the inquiries that are being received are very optimistic. The make of iron during the balance of the year promises to be larger than has been anticipated.

Chicago. Aug. 27.

Sales of pig iron continue extraordinarily active for the month of August. Iron is scarce, both Southern and Northern, for deliveries before the second quarter of 1907, and iron for this year's delivery commands a premium of 25c.@50c. Southern furnaces are generally out of the market for deliveries before the second quarter of 1907, and the same is true of many Northern furnaces.

The quotations of $19@19.25 for Northern and $14.75@15 Birmingham for Southern hold, on general sales, for delivery in 1907. Iron and steel products continue in good demand.

Cleveland. Aug. 28.

Iron Ore—Some of the shippers are notifying customers they cannot ship all of the ore on contract by lake. This has brought about an ardent desire to cover ore contracts for next year.

Pig Iron—The pig iron shortage has reached serious proportions, and the conservative element has given up the fight for conservative prices and is now drifting with the tide. Spot iron, if available, would sell easily at over $20 in the Valleys for No. 2 foundry. Advanced buying is being done on the basis of $19 at the furnace for first half delivery. Basic is selling at $18.50 in the Valleys.

Finished Material—Steel mills have been producing less than their normal capacity for two weeks past, due to the heat and the difficulty of getting the men to work. Bar iron is scarce and mills unite on 1.60c. Pittsburg. Sheets are strong, with the mills eight to ten weeks behind. On beams and channels it is difficult to get delivery.

New York Aug. 29.

Pig Iron—The market is strong and the demand for foundry iron continues heavy. Most of the business done now is for the first quarter of 1907. Iron for delivery this year is not easy to find. There is also a good demand for basic iron, with short supply; Alabama is out of the market for basic. The furnaces have raised prices all around.

Current quotations for pig iron are, for New York or parallel delivery:

Northern:	
No. 1 X foundry	$20@$20.50
No. 2 X foundry	19.2[illegible]@19.75
No. 2 plain	18.75@19.25
Forge pig	17@17.75
Southern:	
No. 1 foundry	19.75@20.50
No. 2 foundry	19@19.75
No. 3 foundry	18.50@19
No. 4 foundry	18@18.50
No. 1 soft	19.75@20.50
No. 2 soft	19@19.75
Gray forge	16.7[illegible]@17.50
Basic pig:	
Northern	18.50@19
Virginia	18.60@19.10
Alabama	.....

City or local deliveries are not included in prices, which are for large lots, on dock or cars.

Cast-Iron Pipe—The demand is heavy for the season. All the foundries are full, and no early deliveries can be had. Prices are $31@32 per ton for 6-in. pipe; but premiums are offered for early deliveries.

Bars—Trade has been active and prices are firm. Business has been done at 1.695 @1.745c., tidewater, for iron bars. Steel bars are 1.645c., tidewater; 1.695c. is asked by most mills. Store trade is good at 2¼c. delivered.

Plates—Business has been moderate locally; material is scarce. Tank-plates are 1.745@1.845c., according to width; flange and boiler, 1.845@1.945c.; fire-box, 2.25c.

Structural Material—Not many new building contracts are forward, but bridgework is pressing. Prices continue nominally for beams, 1.845@1.895, according to size; angles and channels, 1.845c. for large lots, tidewater. Jobbers ask 2.40@ 2.50c. for material out of stock.

Steel Rails—Prices unchanged for heavy sections, $28 at mill. Trolley rails are in demand for next Spring.

Old Material—Demand is good and dealers ask more. Heavy steel melting scrap is in demand at about $17. No. 1 railroad wrought brings $19@20; No. 1 yard wrought, $17@18; while $16@16.50 is taken for machinery cast. Prices are on cars, Jersey City or other terminal delivery.

Pittsburg. Aug. 28.

The expected advance in prices of sheets and tin-plate has not been ordered by the American Sheet and Tin Plate Company and it is doubtful if prices will be disturbed for some time. While conditions of trade warrant an increase it is not deemed advisable, as a runaway market might result and this is to be avoided. The American company has started its Muncie tin-plate plant which has been idle for several months.

The situation in plates and merchant steel bars as to deliveries is worse than at any time this year. Consumers are urging shipment on old contracts and it is impossible to comply with the demands. The leading interest has adopted a plan of shipping a percentage of requirements to each consumer, but this is not giving satisfaction. The heaviest requirements are from steel-car and shipbuilding interests. Some orders that cannot be filled by the large concerns are going to small mills and a premium over the established prices is obtained.

The Carnegie Steel Company has entirely withdrawn from the rail market for this year's delivery. Its Ohio works were put on sheet-bars for two weeks while the Shenango plant at New Castle was off for repairs, but resumed on rails this week. The company will have to carry over 100,000 tons or more of this year's rail orders.

Pig Iron—The high point for bessemer pig iron was reached this week when 4000 tons were sold at $18.75, Valley furnaces, for delivery this year. Other sales were made aggregating 12,000 tons for delivery in the fourth quarter and first half of next year at $18.25 to $18.50. The sales of basic iron aggregated 25,000 tons and a minimum price of $18, Valley furnaces, was established. The Westing-

house Electric and Manufacturing Company has closed contracts for 16,000 tons of foundry iron, 9000 tons for Cleveland, and 7000 tons for the Allegheny works. It is for equal deliveries through the first half. Of these orders 1500 tons is Southern No. 2 for Cleveland and an equal tonnage for Allegheny, on a basis of $15, Birmingham. The Northern iron for Allegheny was on a basis of $18, Valley furnaces, and the iron for Cleveland is said to be at the rate of $18.50 delivered. The quotation in this market of Southern No. 2 is $15.50, Birmingham, and for Virginia No. 2 foundry $18 at the furnace is asked. Gray forge is quoted at $17.85 @18.10, Pittsburg.

Steel—Bessemer billets are quoted at $28@29 and open hearth $29@30. Sheet and tin-plate bars are firm at $30. Plates remain at 1.60c. and merchant steel bars at 1.50c., although the Cambria Steel Company is still quoting 1.60c. for bars.

Sheets—It seems to have been definitely decided that there will be no immediate advance in sheets. Black sheets are quoted at 2.50c. and galvanized at 3.55c. for No. 28 gage.

Ferro-manganese—Prices of ferro range from $85 to $90 for prompt and October shipment.

Cartagena, Spain. Aug. 4.

Iron and Manganiferous Ores—Messrs. Barrington & Holt report the market strong, with a considerable number of inquiries for contracts for next year. Shipments for the week were one cargo, 2500 tons dry ore, and two cargoes, 5450 tons manganiferous ore, all to Great Britain.

For iron ores, quotations are: Ordinary 50 per cent. ore, 8s. 9d.@9s. per ton; special low phosphorus, 9s. 3d.@9s. 6d.; specular ore, 58 per cent. iron, 12s. 1d.; S. P. Campanil, 10s. 6d. For manganiferous ores, prices range from 12s. for No. 3 ore, 35 per cent. iron and 12 manganese, up to 14s. 3d. for No. 1 B, 25 iron and 17 manganese. No ore of No. 1 grade is offering. All prices f.o.b. shipping port.

Dusseldorf, Germany. Aug. 15.

Imports of iron and steel into Germany for the six months ending June 30, are reported as below, in metric tons:

	1905.	1906.	Changes.
Iron and steel	147,955	255,498	I. 107,543
Machinery	41,116	43,129	I. 2,013
Total	189,071	298,627	I. 109,556

The increase was largely in pig iron, steel billets and other semi-finished forms.

Exports for the half-year are reported as below, also in metric tons:

	1905.	1906.	Changes.
Iron and steel	1,485,937	1,774,992	I. 289,055
Machinery	140,587	130,969	D. 9,618
Total	1,626,524	1,905 961	I. 279,437

The total gain this year was 17.2 per cent.

Owing to a change in the form of reports the iron ore movement for the full half-year cannot be given. For the four months March-June, inclusive, this year, imports of iron ore were 2,403,073 tons, and of manganese ore, 126,402 tons. Exports of iron ore were 1,232,365 tons; of manganese ore, 711 tons.

Chemicals.

NEW YORK, Aug. 29.

Copper Sulphate—The market remains practically unchanged. The demand is active although a very slight weakening is noticeable. Supply keeps up to the demand as well as could be expected under the present conditions of the copper market. We quote car-load lots at $5.90 per 100 lb. with smaller parcels at $6 depending upon terms of sale, quantity, etc.

Nitrate of Soda—There is no material change in prices. Advices from Chile indicate that, while the earthquake damage was more extended than at first supposed, the nitrate producing region escaped. The damage at the shipping ports, however, may disarrange exports for a time.

Nickel Sulphate—We quote current prices per lb. for single and double salts, delivered to all points east of the Mississippi river and subject to 2 per cent. discount, as follows: Single salts in 3-bbl. lots, 18c.; 2-bbl lots, 19c.; 1-bbl. lots, 20c.; 100-lb. lots, 23c.; 50-lb. lots, 24c. Double salts in 10-bbl. lots, 11¼c.; 5-bbl. lots 11½.; 1-bbl. lots, 12c.; 100-lb., 13c.; 50-lb., 14c. per pound.

Tin Bichloride—Fluctuations in the price of tin metal, affect the price of bichloride and at this date it is impossible to state accurately the September price of bichloride. The usual fluctuation is ¼c. for each one cent in the price of tin.

Metal Market.

New York, Aug. 29.

Gold and Silver Exports and Imports.
At all United States Ports in July and year.

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1906..	$1,303,248	$9,838,296	Imp. $8,535,048
" 1905 ..	1,159,274	4,973,241	" 3,813,967
Year 1906..	32,913,962	72,376,074	" 39,462,112
" 1905..	40,990,864	21,582,694	Exp. 19,408,170
Silver:			
July 1906 ..	4,360,628	3,270,927	" 1,089,701
" 1905 ..	4,285,000	2,976,296	" 1,308,704
Year 1906 ..	37,797,855	26,947,855	" 10,840,100
" 1905 ..	29,366,266	18,149,719	" 11,216,547

These statements cover the total movement of gold and silver to and from the United States. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Movement, New York.
For week ending Aug. 25 and years from Jan. 1.

Period.	Gold.		Silver.	
	Exports.	Imports.	Exports.	Imports.
Week	$ 6,000	$ 326,520	$ 601,845	$ 15,016
1906	5,946,603	48,771,483	38,856,483	1,393,646
1905	38,045,843	1,211,852	21,885,993	2,450,824
1904	70,303,579	3,765,966	26,372,012	600,912

The gold exported for the week went to Maricaibo; the silver to London. The gold imported for the week came from Cuba and Columbia; the silver from Central America.

The statement of the New York banks—including all the banks represented in the Clearing House—for the week ending Aug. 25, gives the following totals, comparisons being made with the corresponding week of 1906:

	1905.	1906.
Loans and discounts	$1,144,607,900	$1,071,132,800
Deposits	1,181,084,500	1,053,451,700
Circulation	52,310,770	46,107,500
Specie	219,460,300	186,032,800
Legal tenders	84,799,000	81,720,200
Total reserve	$304,249,300	$267,753,000
Legal requirements	295,271,125	263,462,925
Surplus reserve	$8,978,175	$4,290,075

Changes for the week this year were increases of $3,840,400 in loans, $3,096,200 in specie, $308,700 in legal tenders, $95,700 in deposits, and $37,000 in circulation; a decrease of $2,871,425 in surplus reserve.

The following table shows the specie holding, in dollars, of the leading banks of the world:

	Gold.	Silver.	Total.
New York	.....	.....	$186,032,800
England	$188,987,050	.....	188,987,050
France	584,675,535	$212,059,055	796,734,590
Germany	172,885,000	57,630,000	230,515,000
Spain	76,090,000	123,705,000	199,795,000
Netherlands	27,609,000	28,694,500	56,303,500
Belgium	16,010,000	8,005,000	24,015,000
Italy	148,560,000	19,439,000	167,999,000
Russia	553,415,000	29,670,000	583,085,000
Austria	234,960,000	61,250,000	296,210,000
Sweden	19,395,000	.....	19,395,000

The returns of the associated banks of New York are of date Aug. 25, and the others Aug. 24. The foreign bank statements are from the *Commercial and Financial Chronicle*, of New York. The New York banks do not separate gold and silver in their reports.

Shipments of silver from London to the East are reported by Messrs. Pixley & Abell as follows for the year to Aug. 16:

	1905.	1906.	Changes.
India	£ 4,168,371	£ 11,095,833	I. £ 6,927,462
China	753,841	243,400	D. 510,441
Straits	2,800	1,750	D. 1,050
Total	£ 4,925,012	£ 11,340,983	I. £ 6,415,971

Exports for the week were £131,720, all to India. Imports were £161,000 from New York, and £8000 from the West Indies; £169,000 in all.

Indian exchange is firmer, as the exports from India are increasing. The Council bills offered in London were taken at an average of 16.03d. per rupee. The demand for silver in India continues large.

The movement of gold in Germany for the half-year ending June 30 was as follows, reduced to dollars:

	1905.	1906.	Changes.
Imports	$19,900,000	$50,950,000	I. $31 050,000
Exports	9,170,000	11,080,000	I. 1,910,000
Excess, imp.	$10,730,000	$39,870,000	I. $29,140,000

In June of this year there was an extraordinary movement, imports amounting to $20,500,000. It is said that part of this was taken by Berlin banks on Russian account.

The price paid by the United States Treasury for the 100,000 oz. silver bought

Aug. 15, was 66.22c. per ounce. For the 100,000 oz. on Aug. 22 the price was 67c. The purchaser is required to deliver the silver at such mint as the Treasury Department may direct. The silver bought last week is to go to New Orleans.

The silver market has ruled steady on continuance of good demand for India and on French account.

Prices of Foreign Coins.

	Bid.	Asked.
Mexican dollars	$0.51½	$0.53½
Peruvian soles and Chilean	0.46¾	0.49½
Victoria sovereigns	4.85½	4.87½
Twenty francs	3.86	3.89
Spanish 25 pesetas	4.78	4.80

SILVER AND STERLING EXCHANGE.

Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.	Aug.	Sterling Exchange.	Silver. New York, Cents.	Silver. London, Pence.
23	4.84¼	66⅜	30⅞	27	4.84¼	66⅜	30 1/16
24	4.84⅛	66⅞	30 1/16	28	4.84	66¾	30⅞
25	4.84⅛	66⅞	30 1/16	29	4.83¾	66¾	30⅞

New York quotations are for fine silver, per ounce Troy. London prices are for sterling silver, 0.925 fine.

Other Metals.

Daily Prices of Metals in New York.

Aug.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. Cts. per lb.	Spelter. New York, Cts. per lb.	Spelter. St. Louis, Cts. per lb.
23	18¾	18 5/16 @18 9/16	84 9/16	41⅛	5.75	6.02½	5.87½
24	18¾	18 5/16 @18 9/16	84⅝	41	5.75	6.02½	5.87½
25	18¾	18 5/16 @18 7/16	....	41	5.75	6.02½	5.87½
27	18¾	18 5/16 @18 7/16	84 1/16	40¾	5.75	6.02½	5.87½
28	18¾	18 5/16 @18 7/16	84¾	40⅝	5.75	6.02½	5.87½
29	18¾	18 5/16 @18 7/16	84¾	40¼	5.75	6.02½	5.87½

London quotations are per long ton (2240 lb.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars. The price of cathodes is usually 0.125c. below that of electrolytic. The lead prices are those quoted by the American Smelting & Refining Co. for near-by shipments of desilverized lead in 50-ton lots, or larger orders. The quotations in spelter are for ordinary western brands; special brands command a premium.

Copper—The market has been very active during the past week and large transactions were reported from day to day for domestic as well as European consumption. Consumers have now covered their requirements for some time ahead, and, on the other hand, producers are reported to be entirely sold out for two to three months to come. Quotations at the close are 18¾ for Lake; 18 5/16@18 9/16 for electrolytic copper in cakes, wirebars and ingots; 18@18¼ for casting copper, ordinary brands.

The standard market in London has fluctuated within narrow limits and closes steady at £84 15s. for both spot and futures.

Refined and manufactured sorts are quoted: English tough, £87@88; best selected, £89@£89 10s.; strong sheets, £95@96.

The production of Lake copper, which has been kept down by strikes and by the troubles at the Tamarack and Atlantic mines, may be expected to show a larger increase in the remaining months of the year than it has for some months past.

Exports of copper from New York for the week were 2419 tons. Our special correspondent reports the exports for the week from Baltimore at 1836 long tons of fine copper. There were also exported from Baltimore 34 tons of copper ore.

Tin—A sagging tendency has made its appearance and owing to large arrivals the premium prevailing for spot supplies has been very much reduced. Business is being done at 39.75@40.25c.

The London market indicates a lack of interest on the part of the large traders and closes at £182 for spot and £182 7s. 6d. for three months.

Lead—A good business is being done from day to day at unchanged quotations, 5.75c. New York.

It is reported from London that stocks are very low and a premium is being paid for immediate deliveries. The close is firm and higher at £17 10s. for Spanish lead, and £17 11s. 6d. for English lead.

St. Louis Lead Market—The John Wahl Commission Company telegraphs us on Aug. 29 as follows: Lead is scarce and advancing. Missouri lead is selling at 5.70@5.85c., according to brand and delivery.

Spanish Lead Market—Messrs Barrington & Holt report from Cartagena, Spain, under date of Aug. 11, that pig lead has been 76.75 reales per quintal, silver being paid for at 13.25 reales per quintal. This price, on current exchange—27.93 pesetas to £1—is equal to £15 7s. 9d. per long ton, f.o.b. Cartagena. Exports for the week were 166 tons argentiferous lead to Marseilles.

Spelter—A good consumptive demand is reported from the manufacturing centers. However, consumers are well supplied and business is on a small scale. Prices remain steady at 5.87½ St. Louis and 6.02½ New York.

The London market is showing an upward tendency and closes higher at £27 5s. for good ordinaries and £27 10s. for specials.

Spanish Zinc Ore Market—Messrs Barrington & Holt report from Cartagena, Spain, under date of Aug. 11, that the market is still quiet, with no change in the situation. Exports for the week were 2310 tons blende to Antwerp.

Zinc Sheets—The price of zinc sheets is $7.75 per 100 lb. (less discount of 8 per cent.) f.o.b. cars at Lasalle and Peru, in 600-lb. case for gages No. 9 to 22, both inclusive; widths from 32 to 60 in., both inclusive; the lengths from 84 to 96 in., both inclusive. The freight rate to New York is 27.5c. per 100 lb. The fluctuations in the base price for sheet zinc since Jan. 1, 1906, have been small, the highest price having been $8 on Jan. 6, the lowest $7.65 on May 18.

Antimony—Although some holders are disposed to shade prices, the market remains unchanged at 22@23c. for ordinary brands, 23¾@24c. for Hallett's, and 24¾@25c. for Cookson's.

Nickel—Quotations for large lots, New York or other parallel delivery, as made by the chief producer, are 40@45c. per lb. for large orders, according to size of order and terms. For small lots, 50@65c. is charged.

Platinum—Prices have advanced sharply under good demand and limited supply. Dealers are looking for a still further advance owing to the scarcity of the metal. We quote $28.50 per ounce in New York for platinum in unmanufactured form. For scrap platinum $24 per ounce is offered.

Quicksilver—The metal is firm and New York prices are still $41 per flask of 75 lb. for lots of 100 flasks or over, and $42 for small lots down to 10 flasks. For retail quantities, under 10 flasks, pound prices are charged, which work out to about $43 per flask. San Francisco prices are firm at $39.50 for domestic orders and $38 for export.

Minor Metals—For minor metals and their alloys, wholesale prices are, f.o.b. works:

	Per Lb.
Bismuth	$1.50@1.60
Cadmium, 99.5% f. o. b. Hamburg	$1.62
Chromium, pure (N. Y.)	80c.
Copper, red oxide	50c.
Ferro-Chrome (70)	13c.
Ferro-Chrome (7-9% carbon, per lb. Cr.)	9@9½c.
Ferro-Chrome (1% C. for ea. 10% Cr.)	11c.
Ferro-Chrome (60-64% Cr., 3-4% C.	14c.
Ferro-Chrome (60-70% Cr., 1% C. or less)	38c.
Ferro-Molybdenum (50%	95c.
Ferro-Titanium (20%)	80c.
Ferro-Tungsten (37%)	28c.
Ferro-Vanadium (25-50% per lb. vanadium contents)	$7.20@7.50
Magnesium, pure (N. Y.)	1.50
Manganese, pure 98@99% N. Y.	75c.
Manganese—Copper (30%@70%) N.Y.	45c.
Molybdenum (98@99%, N. Y.)	$1.70
Phosphorus, foreign red (f. o. b. N.Y.)	1.10
Phosphorus, American yellow (f.o.b. Niagara Falls)	59c.
Tungsten (best) pound lots	85c.
Ferro-Silicon (50%) spot. Ex ship Atlantic ports	$93@95 ton.

Variations in price depend chiefly on size and conditions of orders.

Aluminum—The chief producers give list prices, for ton lots and over, as follows: No. 1, over 99 per cent. pure, 36c. per lb.; No. 2, over 90 per cent., 34c. Small lots are from 1 to 3c. higher.

Granulated metal is 2c. per lb. over price of ingots; rods, 1c. per lb. over ingots. Rolled sheets are 45c. per lb. up, according to size.

Missouri Ore Market.

JOPLIN, Aug. 25.

The highest price paid for zinc ore was $49 per ton, on an assay basis price ranging from $43 to $46 per ton of 60 per cent. zinc. The average price was $45.30.

The highest price for lead ore was $82 per ton, medium grades selling at from $75 to $80. The average was $77.24.

Lead advanced in a few instances $6.50 per ton, competition waxing very sharp between a couple of the purchasing companies, the average price being $1.24 higher. Zinc prices were generally $1 per ton stronger, but the demand weakened and there was a falling off of 1079 tons in the shipment.

Following are the shipments of zinc and lead ore from the various camps of the district for the week ending today:

	Zinc, lb.	Lead, lb.	Value.
Webb City-Carterville.	2,868,470	786,450	$ 95,261
Joplin	2,575,010	228,110	68,121
Galena-Empire	1,125,220	147,760	29,954
Badger	1,009,710	.....	23,728
Duenweg	797,460	140,800	23,433
Alba	569,510	20,850	14,196
Prosperity	242,970	71,610	8,258
Granby	373,000	30,000	7,800
Aurora	368,770	18,610	6,375
Neck City	228,510	18,350	6,084
Spurgeon	187,550	26,700	4,685
Carthage	133,260	.....	3,131
Baxter	78,750	47,770	3,118
Oronogo	121,770	.....	2,629
Sherwood	98,470	.....	2,315
Central City	86,240	.....	1,854
Zincite	35,310	1,740	913
Totals	10,699,980	1,538,750	$301,855
34 weeks	358,641,040	50,077,840	$9,691,828

Zinc value, the week, $242,422; 34 weeks, $7,786,240.
Lead value, the week, 59,433; 34 weeks, 1,905,888.

The following table shows the average monthly prices of zinc and lead ores in Joplin, by months; the average for zinc being based on the prices of assay basis ores carrying 60 per cent. zinc.

ZINC ORE AT JOPLIN.			LEAD ORE AT JOPLIN.		
Month.	1905.	1906.	Month.	1905.	1906.
January	52.00	47.38	January	61.50	75 20
February	52.77	47.37	February	57.62	72.83
March	47.40	42.68	March	57.20	73.73
April	42.88	44 63	April	58.00	75.13
May	43.31	40.51	May	58 27	78 40
June	40.75	43.83	June	57.80	80.96
July	43.00	43.25	July	58.00	74.31
August	48.83	....	August	58.00	....
September	46.75	....	September	63.50	....
October	47.60	....	October	63 86	....
November	49.55	....	November	68.67	....
December	49.00	....	December	76.25	....

Wisconsin Ore Market.

PLATTEVILLE, Aug. 25.

A strong demand for all grades of ore helped to keep the price of 60 per cent. ore the same as last week. It is reported by one of the buyers that the Mineral Point Zinc Company is again in the market for ore; for some time past they have only been taking up a few local lots, but now that shipments to DePue have commenced it is quite probable that there will be some difference as to which buyer gets the choice lots. Conservative producers are predicting a continued satisfactory market, while the more optimistic predict soaring prices. Lead, sulphur and drybone are holding at the same figure as last week, with a brisk demand for all grades.

A portion of the ore reported this week was loaded but not reported last week, which accounts for the increased tonnage for the week as reported below.

The following camps report ore loaded for the week ending Aug. 25:

Camps.	Zinc, Lb.	Lead, Lb.	Sulphur, Lb.
Platteville	421,460	.....	.....
Cuba City	566,000	.....	.....
Mineral Point	408,000	.....	.....
Buncombe & Hazel Green	263,450	.....	.....
Benton	212,700	50,000	.....
Galena	115,700	35,000	.....
Rewey	132,500	.....	.....
Livingston	82,000	.....	.....
Linden	63,000	.....	.....
Highland	60,000	.....	.....
Dodgeville	43,700	.....	.....
Montfort	.....	.....	160,000
Total for week	2,368,510	85,000	160,000
Year to Aug. 25	45,892,191	2,382,550	2,733,470

Reports from the various camps indicate a probable heavy increase of shipments by next spring.

Mining Stocks.

NEW YORK, Aug. 29.

The general stock market has been uncertain, with moderate fluctuations in price, and a decline of interest generally. Higher rates for money, with a prospect of their continuance, have rather discouraged speculation. Amalgamated Copper closed at $108, after selling $2 higher; American Smelting common closed at $155¼, also a loss; United States Steel at $45½ for the common and $106½ for the preferred.

One sale of Homestake, of South Dakota, was recorded during the week at $84 per share, 14 shares changing hands.

At the Consolidated Exchange, the mining list showed sales of Ontario, of Utah, at $2.85; Mary McKinney, of Cripple Creek, at 55c.; Jim Butler, of Nevada, at $1.50@1.57. There is very little doing in the Comstocks; $1.10 was paid for Hale & Norcross.

In the curb market, mining shares were less active. In the coppers, the leader was Cumberland-Ely, which closed at $9¼, after selling down to $8¾. Nevada Consolidated was fairly active, closing at $18½; the same can be said of Granby Consolidated, which sold at $12½. Furnace Creek brought $3¼. Of other mining stocks, Tonopah, of Nevada, sold at $18¼; Montgomery-Shoshone at $16¾; Tonopah Extension at $5¾. Nipissing Mines, the Cobalt company, closed at $6¾, on large dealings.

Boston. Aug. 28.

Much to the disgust of all interested, mining shares continue to disregard the underlying conditions in the stock market. A few specialties were taken in hand during the week and were marked up sharply, but in most cases prices are a trifle below those of a week ago. Calumet & Arizona is one of the exceptions, having risen $8 per share to $120, with the close tonight at the highest. The last dividend was at the rate of $14 per annum, which accounted for the deserved advance. Butte Coalition was also one of the active specialties, touching $34.50 with the close tonight, $1.25 above a week ago at $32.25. North Butte rose from $92.75 to $95.50 Monday, but reacted to $93.50 today. In both cases it is thought to have been largely manipulation, with a view of creating public interest in copper shares.

Osceola has also been a feature, selling up to $115, with $1 reaction, and Copper Range was an active feature, selling up $1.75 to $79.75, with subsequent reaction. Increased dividend talk is heard in the last named case.

Money is practically on a 6 per cent. basis in this center, which works against heavy speculation here. There is room for appreciation in mining shares, but what is lacking is a lead which, it is hoped, may come from New York's taking hold of Amalgamated. This stock touched $111.50, but is back to $108.25 today. Calumet & Hecla is up to $735 per share.

Colorado Springs. Aug. 24.

The volume of trading in Cripple Creek stocks has been comparatively light during the past week, but prices have held firm and in a majority of cases have advanced. There were no especial features, but practically all stocks of the mines list held strong.

San Francisco. Aug. 23.

Trading in the Comstocks continues light, very little interest being taken in those shares by outsiders. The market for Tonopah and Goldfield stocks, however, is fairly active. A large number of companies are now on the list, and some heavy sales are recorded. Prices have been variable, some stocks gaining and others losing; but, generally speaking, the market is strong. Oil stocks are rather neglected.

Los Angeles, Cal. Aug. 23.

The Los Angeles Stock Exchange is enforcing its rule to drop from the list the names of such companies as do not pay the required calling fee or submit sworn financial statements and reports. This will reduce the calling list very materially as, aside from the fee, many companies are not in a position to file satisfactory reports. In fact a very small proportion of the mines listed were dealt in to any degree, the public showing its preference for such as had some activity. Mere prospects never are favorites. The calls now represent a few Southern California properties, a number of Nevada ones, two from Mexico and one from Arizona. What stocks remain on the list have been passed upon by the Governing Board of the Exchange, which should to a certain extent protect the public dealing in mining stock securities.

STOCK QUOTATIONS.

NEW YORK. Week Aug. 28

Name of Company.	High	Low	Clg.	Sales
Amalgamated*	111⅛	107⅝	108½	873,250
Anaconda*	285	267¾	276	312,190
British Col. Copper	10⅞	9⅛	9⅜	48,625
Butte Coalition*	34⅜	31½	32½	15,385
Cum. Ely Mining	9⅛	7⅞	8⅞	29,300
Greene Gold	2⅜	2¼	2¼	445
Greene Gold & Silver	2¾	2	2⅛	4,038
Guanajuato	5⅜	5⅛	5¼	5,150
Micmac	5½	5	5¼	8,825
Mines Co. of Am	1.27	1.22	1.22	6,400
Mitchell Mining	8	5⅛	6¾	10,174
Mont. Sho. Con. (New)	17	11¾	15⅜	6,500
Nev. Utah M. & S.	4	3⅞	3⅞	3,741
Nipissing Mines	6⅞	6¼	6¾	26,500
Tennessee Copper	45¾	44	45	1,100
Union Copper	1⅛	1⅛	1⅛	16,200
Utah Apex	6¼	5⅞	6⅛	350

NEW YORK INDUSTRIALS.

Am. Smelting & Ref.	162	155½	155⅝	203,400
Am. Smelt. & Ref., Pf.	118¾	116¼	116¾	1,900
Bethlehem Steel	26⅛	25½	25⅛	500
Colo. Fuel & Iron	61	54	55½	150,250
Federal M. & S., Pf	97⅞	95½	95½	2,350
Inter. Salt*	36	35¾	35¾	1,765
National Lead	81	78	78¼	18,400
National Lead, Pf	102½	102	102	300
Pittsburg Coal	15	14	15	200
Republic I. & S.	31½	29¾	30¾	31,600
Republic I. & S., Pf.	101¾	99½	99½	12,350
Sloss-Sheffield	79¾	76½	76½	4,500
Tenn. C. & I.	158	158	158	100
U. S. Red. & Ref	36¾	35¼	35⅛	900
U. S. Red. & Ref., Pf.	76	75	75	1,200
U. S. Steel	47¾	44½	45¼	1,200,251
U. S. Steel, Pf.	108¾	105¼	106½	126,600
Va. Car. Chem	40½	38⅛	38½	4,250

* Ex. div.

BOSTON.

Adventure	6⅛	6¼	6¼	130
Allouez	37	35	35	3,102
Atlantic	14	13	14	515
Bingham	33½	32½	32½	1,885
Boston Consolidated	29¼	28¼	28¾	5,415
Calumet & Arizona	120	112½	120	3,641
Calumet & Hecla*	735	715	735	67
Centennial	26	24⅛	24½	1,728
Copper Range	79⅜	76½	78	13,061
Daly-West	17	16⅜	17	150
Franklin	19⅛	18⅛	19	2,704
Granby	12⅜	12	12⅛	1,053
Greene Consolidated	25⅞	24¾	25¼	6,437
Isle Royal	20¾	20	20¾	2,850
Mass	9	8⅛	8⅛	435
Michigan	14	13¼	13⅜	1,355
Mohawk	63	61	61	581
Mont. Coal & Coke rcts.	2¾	2¼	2¼	250
Nevada	18⅞	18	18½	1,940
North Butte	95	91¾	93½	14,496
Old Dominion	42	39¾	40	1,490
Osceola	115	109½	114	3,468
Parrot	27	26	26½	310
Quincy*	93	90	92	308
Rhode Island	5¼	5	5	2,350
Shannon	9⅞	9	9¼	2,862
Tamarack	99½	98	99½	75
Tecumseh	13	12	12½	812
Trinity	9¼	8½	8½	2,360
United Copper, com.	65½	63¼	63¼	4,295
U. S. Oil	10¼	9¾	10	20
U. S. Smg. & Ref.	59¾	56½	58½	4,608
U. S. Smg. & Ref., pfd.	46	45¾	46	1,317
Utah Copper	61¼	59⅛	60⅜	6,217
Victoria	7¼	7	7	270
Winona	9	8	8	2,078
Wolverine	155	153	155	315
Wyandotte	1.00	1.00	1.00	

These stocks, not elsewhere quoted, had the following range of prices during the week: (New York) Am. Agri. Chem., 25—24¾; Gold Hill, 2¾—2½; Comstock, .14; Gugg. Exp., 295—284; Prec. Metals Co., 5½; Standard Oil, 610—604. (Boston) Ahmeek, 80—78; Am. Zinc, 10; Arcadian, 3—2½; Ariz. Com'l, 38½—38; Black Mt., 8¼—8¼; East Butte, 10¼—9½; Keweenaw, 12¼—11; Majestic, 1¼—1½; Raven, .84—.80; Shawmut, 1.00; Superior Cop., 16—15; Superior & Pitts., 17⅛—16½; Troy, 1⅛—1⅛.

PHILADELPHIA. Aug. 28.

Name of Company.	High	Low	Clg.	Sales.
American Cement	7⅛	7⅛	7⅛	1 890
Cambria Steel	36⅝	34½	34¾	14,117
General Asphalt	9⅛	9	9⅛	200
Penn. Steel, pd	108½	108½	108½	
Philadelphia Co.	49¾	49	49⅛	454
Tonopah Mining	19	18¾	18¾	173

PITTSBURG. Aug. 28.

Crucible Steel	13⅝	13⅛	13⅜	1,068
Crucible Steel, Pf.	80⅝	80	80¼	1,055
Harbison-Walker Ref.	12	11½	12	210
Ohio Tonopah	.30	.27	.27	2,720
Tonopah Ext.	6¾	5¾	5⅞	5,165

COLORADO SPRINGS. Aug. 25.

Name of Company.	High	Low	Clg	Sales
Acacia	15	12¾	14⅛	19,000
C. C. Con	6	5⅞	6	6,000
Doctor Jack Pot	9¼	8¾	9¼	29,000
Elkton	47	46½	47	4,000
El Paso	51	49	51	4,800
Findley	72	70	71	
Gold Dollar	8½	8	8½	14,500
Gold Sovereign	7¼	7	7¼	
Isabella	23¾	22	23⅜	19 000
Jennie Sample	10	9¾	9¾	
Mary McKinney	55	54	55	4,300
Portland	1.40	1.25	1.40	3,900
United Gold Mines	9½	7⅞	9⅜	
Vindicator	95	92	95	
Work	16½	15½	16½	12,500

SAN FRANCISCO. Aug. 22.

Name of Company.	High	Low	Clg	Sales
Best & Belcher	.95	.76	.90	1,830
Caledonia	.34	.24	.32	4,000
Challar	.16	.14	.14	9,000
Con. Cal. & Va	1.10	.92	1.10	8.170
Crown Point	.12	.09	12	7,200
Gould & Curry	.17	.10	.14	10,900
Hale & Norcross	1.25	1.05	1.25	2,800
Mexican	1.20	.78	1.00	9,250
Ophir	3.90	3.50	3.80	5,070
Overman	.13	.11	.13	2,200
Potosi	15	.13	.13	3,300
Savage	1.10	1.00	1.05	4,900
Sierra Nevada	.29	.22	.26	10,400
Bullfrog Mining	.63	.52	.52	69 000
Diamondfield	.52	.43	.43	109.216
Goldfield of Nevada	.68	.52	.65	55,700
Jim Butler	1.65	1.50	1.65	38,200
Jumping Jack	.47	.38	.47	80,500
Kendall	.86	.70	.86	5,600
MacNamara	.85	.80	.80	19,000
Manhattan Dexter	.76	.61	.61	21,400
North Star	61	.50	.55	49,200
Original Bullfrog	.17	.15	.17	52,900
Tonopah Belmont	5.25	5.00	5.25	100

Tonopah Stocks. Aug. 29.

(Revised by Weir Bros. & Co., New York.)

	High.	Low.	Last.
Tonopah Mine of Nevada	18.75	18.00	18.75
Tonopah Montana	3.00	2.96	3.00
Tonopah Extension	5.50	5.25	5.50
Tonopah Midway	2.27	2.25	2.27
Tonopah West End	2.85	2.85	2.85
Goldfield Mining Co.	.72	.71	.71
Jumbo Mining	1.47	1.47	1.47
Red Top	1.60	1.58	1.60
Sandstorm	.85	.81	.81
Montgomery Shoshone Cons	16.00	15.50	16.00

St. Louis. Aug. 25.

Adams, $0.40—$0.25; American Nettie, $0.10—$0.08; Center Creek, $2.50—$1.90; Central Coal and Coke, $64.00—$63.50; Central Coal and Coke, pfd., $80.00—$79.00; Central Oil, $60.00—$58.00; Columbia, $5.00—$3.90; Con. Coal, $23.00—$19.00; Doe Run (old stock), $350.00—$300.00; Granite Bimetalic, $0.25—$0.20; St. Joe (old stock), $32.00—$30.00.

LONDON. (*By Cable.**) Aug. 29.

Dolores, £1 15s. 0d.; Stratton's Independence, £0 4s. 6d.; Camp Bird, £1 7s. 0d.; Esperanza, £3 4s. 4½d.; Tomboy, £1 5s. 0d.; El Oro, £1 13s. 1½d.; Oroville, £0 18s. 9d.; Somera, £0 7s. 6d.; Utah Apex, £1 5s. 0d.; Ariz. Copper, Pref., £3 12s. 9d.; Ariz. Copper, Def., £3 10s. 6d.

*Furnished by Hayden, Stone & Co., New York.

New Dividends.

Company.	Payable.	Rate.	Amt.
Butte Coalition	Sept. 14	$0.40	$400,000
Calumet & Hecla	Sept. 20	20.00	2,000,000
Calumet & Arizona	Sept. 20	3.50	700,000
Con. Mercur	Sept. 25	0.02½	25,000
Federal Mg. & Smelting	Sept. 15	4.00	240,000
Federal Mg. & Sm. pfd.	Sept. 15	1.75	210,000
Greene Con. Copper	Sept. 15	0.40	345,500
National Lead	Oct. 1	1.00	149,054
National Lead, Pfd.	Sept. 15	1.75	260 820
Parrot	Sept. 12	0.25	57,463
Republic Iron & St., pfd.	Oct. 1	3.75	768,634
Standard Oil	Sept. 15	6.00	5,820,000
U. S. Red. & Ref., pfd.	Oct. 1	1.50	59.187

Assessments.

Company.	Delinq.	Sale.	Amt.
Alta, Nev	Sept. 3	Sept. 26	$0.05
Black Diamond, Utah	Sept. 15	Oct. 6	0.01
Champion Mines, Cal	Sept. 4	Sept. 25	0.50
Diamond Creek, Cal	Aug. 31	Sept. 17	0.01
Lower Mammoth, Utah	Sept 15	Oct. 4	0.05
Sierra Nevada, Nev	Sept. 12	Oct. 4	0.10

Monthly Average Prices of Metals.

SILVER.

Month.	New York.		London.	
	1905.	1906.	1905.	1906.
January	60.690	65.288	27.930	30.113
February	61.023	66.108	28.047	30.464
March	58.046	64.597	26.794	29.854
April	56.600	64.765	26.108	29.984
May	57.832	66.976	26.664	30.968
June	58.428	65.394	26.910	30.185
July	58.915	65.105	27.163	30.113
August	60.259	.. ..	27.822	.....
September	61.695	.....	28.528	.....
October	62.034	.....	28.637	.....
November	63.849	.....	29.493	.....
December	64.850	.....	29.977	.....
Year	60.352	.....	27.839	.....

The New York prices are in cents per fine ounces; the London quotation is in pence per standard ounce, .925 fine.

COPPER.

	NEW YORK.				LONDON.	
	Electrolytic.		Lake.			
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	15.008	18.310	15.128	18.419	68.262	78.896
Feb.	15.011	17.869	15.136	18.116	67.963	78.147
March	15.125	18.361	15.250	18.641	68.174	81.111
April	14.920	18.375	15.045	18.688	67.017	84.793
May	14.627	18.457	14.820	18.724	64.875	84.867
June	14.673	18.442	14.813	18.719	65.881	83.994
July	14.888	18.190	15.005	18.585	66.887	81.167
Aug.	15.664	.....	15.725	.....	69.830	.....
Sept.	15.965	.....	15.978	.....	69.667	.....
Oct.	16.279	.....	16.332	.....	71.406	.....
Nov.	16.599	.....	16.758	.....	74.727	.....
Dec.	18.328	.....	18.398	.....	78.993	.....
Year	15.590	.....	15.699	.....	69.465	.....

New York prices are in cents per pound. Electrolytic quotations are for cakes, ingots or wire bars. The London prices are in pounds sterling, per long ton of 2,240 lb., standard copper.

TIN IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	29.335	36.390	July	31.760	37.275
Feb	29.262	36.403	August	32.866	.....
March	29.523	36.662	Sept	32.095	.....
April	30.525	38.900	Oct	32.481	.....
May	30.049	43.313	Nov	33.443	.....
June	30.329	39.260	Dec	35.835	.....
			Av. year.	31.358	.....

Prices are in cents per pound.

LEAD IN NEW YORK.

Month.	1905.	1906.	Month.	1905.	1906.
Jan	4.552	5.600	July	4.524	5.750
Feb	4.450	5.464	Aug.	4.665	.....
March	4.470	5.350	Sept.	4.850	.....
April	4.500	5.404	Oct.	4.850	.....
May	4.500	5.685	Nov.	5.200	.....
June	4.500	5.750	Dec.	5.422	.....
			Av., year.	4.707	.....

Prices are in cents per pound. The London average for January, 1906, was £ 16.850 per long ton; February, £ 16.031; March, £ 15.922; April, £15.959; May, £16.725; June, £16.813; July, £16.525.

SPELTER.

Month.	New York.		St. Louis.		London.	
	1905.	1906.	1905.	1906.	1905.	1906.
Jan.	6.190	6.487	6.032	6.337	25.062	28.225
Feb.	6.139	6.075	5.989	5.924	24.594	25.844
Mar.	6.067	6.209	5.917	6.056	23.825	24.563
April	5.817	6.078	5.667	5.931	23.813	25.781
May	5.434	5.997	5.284	5.846	23.594	27.000
June	5.190	6.096	5.040	5.948	23.875	27.728
July	5.396	6.006	5.247	5.856	23.938	26.800
Aug.	5.706	.....	5.556	.....	24.675	.....
Sept.	5.887	.....	5.737	.....	26.375	.....
Oct.	6.087	.....	5.934	.....	28.225	.....
Nov.	6.145	.....	5.984	.....	28.500	.....
Dec.	6.522	.....	6.374	.....	28.719	.....
Year.	5.822	.....	5.730	.....	25.433	.....

New York and St. Louis prices are in cents per pound. The London prices are in pounds sterling per long ton (2,240 lb.) good ordinary brands.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—		
Bort, good drill quality, carat		$85.00
Carborundum, f.o.b. Niagara Falls, powd	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05¾@.06
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02½
Garnet, per quality	sh ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01¾
Lump, per quality	"	.03@.20
Rottenstone, ground	"	.03@.04
Lump, per quality	"	.03@.08
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07½@.07¾
ACIDS—		
Acetic 28%	lb.	.02¼@.02¾
Boric	"	.10@.11
Hydrofluoric, 30%	"	.03
" 48%	"	.06
" 60%	"	.10½
Hydrochloric acid ,20°, per lb		1.25@1.50
Nitric acid, 38°	per lb.	4.25@4.62½
Sulphuric acid, 50°, bulk, per ton		$12 up.
60°, 100 lb. in carboys		.90@1.12½
60°, bulk, ton		18.00@20.00
66°, 100 lb. in carboys		1.00@1.25
66°, bulk, ton		20.00@21.00
Oxalic	"	.06¼@.06½
ALCOHOL—Grain	gal.	2.46¾
Refined wood, 95@97%	"	.70@.75
ALUM—Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	lb.	0.05
ALUMINUM—Sulphate, com'l.	"	1.25@1.60
AMMONIA—24 deg. lb		.04½@.05½
" 26 " "		.04¾@.05¾
AMMONIUM—		
Bromide	lb.	.23
Carbonate	"	.08¼@.08½
Muriate grain	"	.05¾@.06
Lump	"	.09½@.09¾
Sulphate, 100 lb		3.05@3.12½
Sulphocyanide com	"	.30
" " chem. pure	"	.40
ANTIMONY—needle, lb		16@17c.
ARSENIC—White (nominal)	"	.04¾
Red	"	.06¾
ASPHALTUM—		
Barbadoes	per ton.	40.00@80.00
West Indies	"	20.00@60.00
Egyptian	lb.	.09@.10
Gilsonite, Utah ordinary	per ton.	50.00
Trinidad	"	30.00@40.00
California	"	20.00@30.00
BARIUM—		
Carb. Lump, 80@90%	sh. ton.	30.00@35.00
Powdered, 80@90%	lb.	.02@.02½
Chloride com'l	ton.	37.00@40.00
Nitrate, powdered, in casks	lb.	.06
Sulphate (Blanc Fixe)	"	.02¼
BARYTES—		
Am. Ground	sh. ton.	15.00@21.00
Floated	"	15.30@21.00
Foreign floated	"	21.00
White	"	21.00
BISMUTH—Sub-nitrate	lb.	1.50
BLEACHING POWDER—35%, 100 lb.		1.25
BLUE STONE—(copper sulphate), carload, per 100 lb		5.90
BONE ASH	lb.	.02½@.02½
BORAX	"	.07½@.07½
CALCIUM—Acetate, gray	"	2.35@2.40
Acetate, brown	"	1.60@1.65
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	12.50
CEMENT—		
Portland, Am. 500 lb	bbl.	1.55@1.60
Foreign	"	2.50@3.00
"Rosendale," 300 lb. (in sacks)	"	.85
		.65
Slag cement	"	.75@1.25
CHROME ORE—		
New Caledonia 50% ex. ship N. Y.	per lg. ton	17.25@19.75
Bricks, f.o.b. Pittsburg, M.	"	175.00
CLAY, CHINA—Am. common ex-dock, N. Y.	"	8.00 up.
Foreign	"	11.00@18.00
COBALT—Oxide	lb.	2.50
COPPERAS—Bulk	100 lb.	$0.47½
In bbls	"	.57½
In bags	"	.52½
CRYOLITE	lb.	.06½
FELDSPAR—Ground best	sh. ton.	15.00@20.00
Common		10.00@12.00
FIRE BRICK.		
American	per M.	30.00@40.00
Imported	"	33.00@45.00
St. Louis No. 1	"	16.00
" No. 2	"	14.00
Extra	"	20.00@23.00
FIRE CLAY.		
St. Louis mill	per ton	2.50
FLUORSPAR—		
Domestic f.o.b. shipping port:		
Lump	sh. ton.	8.00@10.00
Ground	"	11.50@13.50
Gravel	"	4.25@4.50
Foreign crude ex. dock		8.00
FULLER'S EARTH—Lump	100 lb.	.75@.90
Powdered	"	.80@1.25
GRAPHITE—		
American, ore, common	lb.	.01@.10
Artificial	"	.06
Ceylon, common pulv	"	.02½@.03½
Best, pulverized	"	.04@.08
German, com. pulv	"	.01½@.01½
Best, pulverized	"	.01½@.02
Italian, pulverized	"	.01@.02
GYPSUM—		
Fertilizer	"	7.00
Rock	lg. ton.	4.00
INFUSORIAL EARTH—		
Ground Am. best	"	39.00
French	"	56.00
German	"	56.00@59.00
LEAD—Acetate (sugar of)	lb.	.07½
Nitrate, com'l	"	.07½@.08
MAGNESITE—Greece.		
Crude (95%)	lg. ton.	7.00@8.00
Calcined	sh. ton.	35.00@40.00
Bricks, domes, per qual. f.o.b. Pittsburg	M.	160@200
MAGNESIUM—		
Chloride, com'l	lb.	.01@.01½
Sulphate (Epsom salt)	100 lb.	.95
MANGANESE—		
Crude powdered:		
70@75% binoxide	lb.	.02
75@85% binoxide	"	.02½
85@90% binoxide	"	.04
90@95% binoxide	"	.05½
Ore, 80%-90%	sh. ton.	50.00
MARBLE—Flour	sh. ton.	8.00@8.50
MINERAL WOOL—		
Slag, ordinary	"	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
MONAZITE SAND—		
Guar. 9%, with 5% Thorium oxide, nominal	lb.	.14@.15 and up.
NICKEL—		
Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb,	.18@.24
" double	"	.11½@.14
NITRATE OF SODA—100 lb. 96% for 1906		2.50@2.55
95% for 1907		2.40
95% for 1908		2.30
96% is 7½c higher per 100 lb.		
OZOKERITE—best	lb.	.15
PAINTS AND COLORS—		
Litharge, Am. powdered	"	.07½@.07¾
English glassmakers'	"	.08½@.08½
Lithopone	"	.03½@.07
Metallic, brown	sh. ton.	19.00
Red	"	16.00
Ocher, Am. common	"	8.50@9.00
Best	"	16.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02½
Paris green, pure, bulk	"	.21@.25
Red lead, American	"	.07½@.07¾
Foreign	"	.08½@.08½
Turpentine, spirits	gal.	.62@.63½
White lead, Am., dry	lb.	.06¾@.06½
American, in oil	"	.07@.07¾
Foreign, in oil	"	.09¼@.09¾
Zinc white, Am. extra dry	"	.05½@.05½
Foreign, red seal, dry	"	.07½@.07¾
Green seal, dry	"	.07½@.08½
PHOSPHATES—Acid	65@67½c per unit	
*Fla., hard rock		7.50
land pebble 68%		4.50@5.00
†Tenn., 78@80%		6.50
78%		6.00
75%		4.50@5.00
68@72%		3.50@4.00
‡So. Car. land rock		4.50
" " river rock		3.00
POTASSIUM—		
Bicarbonate crystal	lb.	$0.08
Powdered or granulated	"	.08½
Bichromate, Am	"	.08½
Scotch	"	.11
Bromide	"	.16
Carbonate (80@85%)	"	.03½
Caustic, ordinary	"	.04½
Elect. (90%)	"	.05½
Chloride (muriate), 100 lb		1.90
Chlorate, powdered	"	.08½
Crystals	"	.08½
Cyanide (98@99%)	"	.18@.19
Kainite, long ton, bulk, 8.50; bags, 9.50.		
Permanganate	lb.	.09
Prussiate, yellow	"	.15½
Red	"	.33
Sulphate	100 lb.	2.18½@2.21½
PYRITE—		
Domestic, non-arsenical, furnace size	per unit	11@11½c.
Domestic, non-arsenical, fines, per unit		9@10½c.
Imported non-arsenical, furnace size, per unit		13c.
Imported, arsenical, furnace size, per unit		12@12½c.
Imported fines, arsenical, per unit		8½@9c.
" " non-arsenical, per unit		10½@11c.

Pyrite prices are per unit of sulphur. An allowance of 25c. per ton is made when delivered in lump form.

SALT—N. Y. com. fine 280 lb. bbl.		.72@1.18
N. Y. agricultural	sh. ton.	3@4.40
SALTPETER—Crude	100 lb.	5.00
Refined, crystals	"	5.00
SILICA—		
Ground quartz, ord'ry	sh. ton	13.00@15.00
Best	"	30.00@40.00
Lump Quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Nitrate, crystals	oz.	.41
SODIUM—		
Acetate	lb.	.04¼@.04½
"Alkali," per lb., 58%		78½@87½c.
Bicarb. soda, per lb		1.4@1.6c.
Soda, caustic, per lb., 60%		1¾c.
" " powdered		1¾c.
Salt cake, per 100 lb		70c.
Sal soda, per lb		7c.
Soda, monohydrate, per lb		1½c.
Bichromate	lb.	.06½
Bromide	"	.16
Chlorate, com'l	"	.08½
Cyanide, ("100% KCN")	"	.18@.19
Hyposulphite, Am	"	1.50@1.75
German	"	1.75@2.00
Phosphate	100 lb.	1.75 up.
Prussiate	"	.09
Sal soda, f.o.b. works	100 lb.	.60
Foreign, f.o.b. N. Y.	"	.75
Silicate, com'l	100 lb.	.80@1.00
Sulphate, com'l, (Glauber's salt)	100 lb.	.40 up.
" " calcined		1.00
STRONTIUM—Nitrate	lb.	.07½
SULPHUR—		
Louisiana (prime) to New York, Boston or Portland	ton	20.00
To Philadelphia or Baltimore	"	20.50
Roll	100 lb.	1.85@2.15
Flour	" "	2.00@2.40
Flowers, sublimed	" "	2.20@2.60
TERRA ALBA—French & Eng.	100 lb.	.90@1.00
TALC—Domestic	sh. ton.	18.00@25.00
French, best	"	25.00
Italian, best	"	35.00 and up
TIN—Bi-chloride, 50%	lb.	11½c.
Crystals	"	24½@26½c.
Oxide, lb		50c.
URANIUM—Oxide	"	3.50
ZINC—Metallic ch. pure	"	.15
Chloride solution, com'l	"	.02½@.02½
Chloride, granular	"	.04½
Dust	"	.05½
Sulphate	"	.02½

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel Ashley River, S. C.

Note—These quotations are for wholesale lots in New York, unless otherwise specified, and are generally subject to the usual trade discounts. Readers of THE ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.

DIVIDENDS.

Metal and Mining Companies—U. S.

Name of Company and Location.		Author-ized Capital	Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Al'ka	$1,000,000	180,000	$ 5	$1,428,381	July 1906	$ .30
Alaska Treadwell, g.	Al'ka	5,000,000	200,000	25	8,735,000	July 1906	1.00
Alaska United, g.	Al'ka	1,000,000	180,200	5	216,240	July 1906	0.30
Amalgamated, c.	Mont	155,000,000	1,530,879	100	41,399,524	Aug. 1906	1.75
Am.Sm.&Ref.,com.	U. S.	50,000,000	500,000	100	7,625,000	July 1906	1.75
Am. Sm. & Ref. pf.	U. S	50,000,000	500,000	100	21,706,553	July 1906	1.75
Am. Smelters, pf. A	U. S.	17,000,000	170,000	100	923,000	Sept. 1906	1.50
Am. Smelters. pf. B	U. S.	30,000,000	300,000	100	1,875,000	Sept. 1906	1.25
Anaconda,c.	Mont	30,000,000	1,200,000	25	28,850,000	July 1906	1.37½
Annie Laurie, g.	Utah	5,000,000	25,000	100	465,061	July 1905	.50
Arizona, c.	Ariz	3,775,000	3,682,520	.....	6,182,361	Apr. 1906	.05
Atlantic, c.	Mich	2,500,000	100,000	25	990,000	Feb. 1905	.02
B. & H., l. z.	Mo	400,000	400,000	1	40,000	Dec. 1905	.01
Beck Tunnel, g.s.l.	Utah	1,000,000	1 000,000	1	155,000	Aug. 1906	.02½
Boston & Montana.	Mont	3 750,000	150,000	25	46,075,000	Aug. 1906	12.00
Bull.Beck.&Cham.g	Utah	1,000,000	100,000	10	2,508,400	July 1906	.10
Bunker Hill & Sull.	Ida	3,000,000	300.000	10	6,966,000	Aug. 1906	.60
Butte & Boston, c.	Mont	2,500,000	200,000	25	1,800,000	Feb. 1904	1.00
Butte Coalition, c.s.	Mont	15,000,000	1,000,000	15	400,000	Sept. 1906	.40
Calumet & Arizonac	Ariz	2,500,000	200,000	10	5,200,000	Sept. 1906	3.50
Calumet & Hecla,c.	Mich	2,500,000	100,000	25	96,350,000	Sept. 1906	20.00
Camp Bird, g., s.	Colo	5,500,000	820,000	5	3,382,500	Feb. 1906	.24
Carisa, c.g.	Utah	500,000	500,000	1	35,000	July 1906	.01
Central Eureka, g.	Cal	400,000	398,425	1	778,921	Mar. 1906	.07
C. K. & N., g	Colo	1,500,000	1,431,900	1	229,104	Dec. 1904	.01
Con. Mercur, g.	Utah	1,000,000	1,000,000	1	1,180,000	Sept. 1906	.02½
Continental, g. l.	Mo	550,000	22,000	25	154,000	Apr. 1906	.50
Copper Range Con.	Mich	38,500,000	383,781	100	2,448,100	July 1906	1.25
Creede United, g.	Colo	2,000,000	1,625,000	1	214 053	July 1909	.00½
Cripple Creek Con.g	Colo	2,000,000	2,000,000	1	180,000	Mar. 1905	.00½
Daly West, g. s. l.	Utah	3,600,000	180,000	20	5,283,000	June 1906	.60
De Lamar, g. s.	Ida	400,000	67,180	5	2,926,370	May 1905	.72
Dillon, g.	Colo	1,250,000	1,250,000	1	21,875	July 1905	.01
Doctor Jack Pot.	Colo	3,000,000	3,000,000	1	268,000	July 1906	.00½
Doe Run, l.	Mo	10,000,000	59,662	100	933,010	May 1906	.50
Elkton Con., g.	Colo	3,000,000	2,500,000	1	1,666,960	July 1906	.00½
El Paso, g.	Colo	2,500,000	2,450,000	1	997,750	June 1906	.01
Fed. Sm., com.	Idaho	10,000,000	60,000	100	1,448,750	Sept. 1906	4.00
Federal Sm., pf.	Idaho	20,000,000	120,000	100	2,231,250	Sept. 1906	1.75
Findley, g.	Colo	1,250,000	1,250,000	1	325,000	Aug. 1906	.01
Gemini-Keystone	Utah	500,000	5.000	100	1,850,000	July 1906	10.00
Gold King Con	Colo	5 750,370	5,750,370	1	1,407,504	May 1905	.01
Gold Sovereign	Colo	2,000,000	2,000,000	1	10,000	Jan. 1905	.00½
Grand Central, g.	Utah	250,000	250,000	1	1,101,250	July 1906	.06
Gwin Mine, Dev., g.	Cal	1,000,000	100,000	10	35,000	Mar. 1906	.25
Hecla, s. l.	Idaho	250,000	1,000,000	0.25	700,000	July 1906	.02
Homestake, g.	S. D	21,840,000	218,400	100	14,879,350	Aug. 1906	.50
HornSilver,g s.c.z.l	Utah	10,000 000	400,000	25	5,482,000	June 1906	.05
Inter'l Nickel, pf.	N. Y.	12,000,000	87,415	100	262,245	Aug. 1906	1.50
Iron Silver	Colo	10,000,000	500,000	20	3,800,000	Oct. 1906	.20
Jamison, g.	Cal	3,900.000	390,000	10	247,270	July 1906	.03
Jerry Johnson.	Cal	2,500,000	2,500,000	1	61,700	Apr. 1906	.03
Kendall, g.	Mont	2,500,000	500 000	5	630,000	July 1906	.03
Liberty Bell,g. s.	Colo	700,000	130,551	5	110,857	Jan. 1906	.15
Lightner, g.	Cal	125,000	102,255	1	295,694	Aug. 1905	.05
Mammoth, g. s. l.	Utah	10,000 000	400,000	25	2,040,000	July 1906	.05
Mary McKinney, g.	Colo	1,500,000	1,304,252	1	645,254	July 1906	.03
Mohawk, c.	Mich	2,500,000	100,000	25	500,000	July 1906	3.00
Mont. Ore Purch.	Mont	2,500,000	80,833	25	6,608,119	Apr. 1906	10.00
Monument, g.	Colo	300,000	300,000	1	27,124	Apr. 1905	.01
Nevada Keystone, g	Nevada	1,000,000	638,877	1	61,790	Feb. 1904	.03
New Century, z., l.	Mo	150,000	150,000	1	25,500	July 1906	.01
New Idria, q.	Cal	500,000	100,000	5	840,000	July 1906	.20
New Jersey, z.	U. S.	10,000,000	100,000	100	8,400,000	Feb. 1906	3.00
North Butte	Mont	6,000,000	400,000	15	2,600,000	Sept. 1906	2.00
North Star, g.	Cal	2,500,000	250,000	10	1,136,989	July 1906	.20
Northern Light,g s	Utah	2,000,000	400,000	5	20,000	Feb. 1904	.05
Old Dominion Cop.	Ariz	7,500,000	281,589	25	280,843	May 1906	.50
Old Gold	Colo	2,101,150	2,101,150	1	10,506	Mar. 1906	.05
Ophir, g. s.	Nevada	302,400	100,800	3	1,797,400	July 1904	.25
Osceola, c.	Mich	2,500,000	96,150	25	5,785,700	July 1906	6.00
Parrot, c.s.	Mont	2,300,000	229,850	10	8,577,800	Sept. 1906	.25
Pennsylvania, g.	Cal	5,150,000	51,500	100	284,925	July 1905	.10
Platteville, l. z.	Wis	20,000	500	40	89,500	Oct. 1905	10.00
Portland, g.	Colo	3,000,000	1,000,000	1	7,267,086	July 1906	.05
Quicksilver, pf.	Cal	4,500,000	43,000	100	1,931,411	May 1903	.50
Quilp, g	Wash	1,500,000	1,500,000	1	15,000	Apr. 1904	.01
Quincy, c.	Mich	2,500,000	100,000	25	16,220,000	Sept. 1906	2.50
Red Bird, g. s. c. l.	Mont	1,500,000	300,000	5	72,000	Dec. 1904	.01
Rob Roy, z.	Mo	15,000	15,000	1	9,600	May 1906	.03
Rocco Homest'k,l.s.	Nevada	300,000	300,000	1	112,000	Dec. 1905	.02
Sacramento, g. q.	Utah	5,000,000	1,000,000	1	235,000	July 1906	.00½
Salvator, g. s. l.	Utah	200,000	200,000	1	6,500	Aug. 1904	.01
St. Joseph, l.	Mo	20,000,000	1,000,000	10	4,658,357	June 1906	.15
Silver Hill, g. s.	Nevada	108,000	108,000	1	59,400	Feb. 1906	.05
Silver King, g. s. l.	Utah	3,000,000	150,000	20	10,275,000	July 1906	.33½
Spearfish, g.	S. D	1,500,000	1,500,000	1	165,500	Jan. 1905	.01½
Standard Con., g. s.	Cal	200,000	178,394	10	4,178,174	Feb. 1906	.10
Stratton'sIndepend	Colo	5,500,000	1,000,007	5	4,895,865	Apr. 1906	.12½
Tamarack, c.	Mich	1,500,000	60,000	5	9,000,000	July 1906	2.00
Tennessee, c.	Tenn	5,000,000	175,000	25	875,000	July 1906	1.25
Tomboy, g. s.	Colo	1,750,000	300,000	5	900,000	June 1906	.48
Tonopah of Nev.	Nevada	1,000,000	1,000,000	1	1,950,000	July 1906	.35
Tonopah Belmont	Nevada	2,000,000	1,295,007	1	129,500		.10
Tonopah Ext'nsion	Nevada	1,000,000	928,433	1	278,530	Apr. 1906	.15
Tonopah Midway	Nevada	1,000,000	1,000,000	1	200,000	July 1906	.05
Uncle Sam, g.s.l.	Utah	500,000	500,000	1	115,000	July 1906	.01
United Cop. Com.	Mont	75,000,000	450,000	100	2,812,500	July 1906	1.75
United, c. pf	Mont	5 000,000	50,000	100	1,200,000	May 1906	3.00
United, z. l., com	Mo	5,000,000	92,400	5	27,450	Oct. 1903	.05
United, z. l., pf	Mo	1,000,000	19,556	25	197,084	July 1905	.50
United, (Crip'le C'k)	Colo	5,000,000	4,009,100	1	280,071	Apr. 1905	.00½
United Verde, c.	Ariz	3,000,000	300,000	10	17,085,322	Dec. 1904	.75
Un.States,pf.g.s.c.l*	Utah	37,500,000	750,000	50	1,312,500	July 1906	.87½
U.S. Red. & Ref. Pf.	Colo	4,000,000	39,458	100	769,431	July 1906	1.50
Utah, g.	Utah	1,000,000	100,000	10	230,000	July 1906	.01
Utah Con., c.	Utah	1,500,000	360,000	5	5,136,000	July 1906	2.50
Victoria, Utah	Utah	250,000	250,000	1	57,000	July 1906	.04
Vindicator Con., g.	Colo	1,500,000	1,500,000	1	1,470,000	July 1906	.03
Wolverine, c.	Mich	1,500,000	60,000	25	3,390,000	July 1906	8.00
Work, g	Colo	1,500,000	1,500,000	1	30,000	July 1906	.01
Yankee Con.	Utah	500.000	500.000	1	112 500	June 1906	.02½

*Previous to consolidation $1,436,250 were divided.

Coal, Iron and Other Industrials—United States.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Ala. Con., C. & I., pf.	Ala	$2,500,000	24,638	100	$905,265	May 1905	$1.75
Allis-Chalmers, pf.	U S	25,000,000	200,000	100	3,213,750	Feb. 1904	1.75
Amer. Ag. Chem., pf.	U. S	20,000,000	181,530	100	6,286,790	Apr. 1905	3.00
American Cement.	Pa.	2,000,000	200,000	10	948,000	July 1906	.30
American Coal.	Md	1,500,000	50,000	25	1,920,000	Sept. 1906	1.25
Associated Oil.	Cal	21,000,000	21,000,000	1	630,000	Aug. 1905	.01½
Bethlehem Steel, pf.	Pa.	15,000,000	150,000	100	525,000	Feb. 1906	1.75
Bon Air C. & I., pf.	Tenn	2,500,000	18,803	100	249,757	Oct. 1904	1.50
Cambria Steel.	Pa.	50,000,000	900,000	50	6,750,000	Aug. 1906	.75
Caribou Oil.	Cal	100,000	80,000	1	56,000	July 1905	.07
Central C. & C., com.	Mo	5,125,000	51,250	100	1,768,125	July 1906	1.50
Central C. & C., pf.	Mo	1,875,000	18,750	100	1,218,750	July 1906	1.25
Central Oil	W. Va.	1,500,000	60,000	25	182,500	May 1904	.25
Claremont Oil.	Cal	500,000	450,000	1	58.500	June 1905	.01
Col. & Hock. C. & I.	Ohio	7,000,000	69,244	100	173,086	Feb. 1905	.25
Consolidated Coal	Ill.	5,000,000	50,000	100	350,000	July 1904	1.00
Consolidation Coal	Md	10,250,000	102,500	100	3,289,150	July 1906	1.50
Crucible Steel, pf.	Pa.	25,000,000	250,000	100	625,000	June 1906	1.50
Empire S. & I., pf.	N. J	5,000,000	25,000	100	562,500	July 1906	1.50
Fairmont Coal,	W. Va.	12,000,000	120,000	100	840,000	Feb. 1906	2.00
Four Oil.	Cal	500,000	300,000	1	105.406	July 1905	.01
General Chem. Com.	U. S	12,500,000	74,103	100	1,596,919	Sept. 1906	2.00
General Chem., pf.	U. S.	12,500,000	100,000	100	4,075,178	July 1906	1.50
George's C'k Coal	Md	2,500,000	22,000	100	1,188,000	July 1904	3.00
Home Oil.	Cal	100,000	100,000	1	507,500	Oct. 1904	.02½
Ill. Crude Oil	Cal	200,000	200,000	1	12,500	Dec. 1904	.01½
Imperial Oil	Cal	1,000,000	100,000	100	880,000	July 1905	.20
International Salt.		30,000,000	182,280	100	744,780	Sept 1906	1.00
Jeff. & Cl'f C. & I., cm	Pa.	1,500,000	15,000	100	330,000	Aug. 1905	5.00
Jeff. & Cl'f. C. & I.,pf	Pa.	1,500,000	15,000	100	825,500	Aug. 1906	2.50
Kern River Oil.	Cal	2,000,000	20,000	100	39,500	May 1905	.13
Lehigh Coal & Nav.	Pa.	14,345,650	346,897	50	23,533,303	Nov. 1905	2.00
Maryland Coal,pf.	Md	2,000,000	18,850	100	1,442,560	June 1906	4.00
Monon R. Coal, pf.	Pa.	10,000,000	100,000	100	3,154,945	Jan. 1906	.97
Monte Cristo Oil.	Cal	500,000	500 000	1	120,000	July 1905	.01
National Carbon, pf.	U. S.	4,500,000	45,000	100	2,047,500	May 1905	1.75
National Lead, com.	N. Y.	15,000,000	149,054	100	1,639,594	Oct. 1906	1.00
National Lead, pf.	N. Y.	15,000,000	149,040	100	15,540,868	Sept. 1906	1.75
Nat'l Steel & Wire,pf.	N. Y.	5,000,000	25,778	100	631,561	May 1906	1.75
New Central Coal	Md	1,000,000	50,000	20	310,000	Nov. 1905	.40
Oil City Petroleum.	Cal	500,000	500,000	1	55,000	July 1905	.00½
Pacific Coast Borax.	Cal	2,000,000	19,000	100	2,086,500	Aug. 1905	1.00
Peerless Oil.	Cal	1,000,000	92,000	10	396,320	May 1905	.14
Penna. Salt.	Pa.	3,000,000	60,000	50	13,988,000	Oct. 1905	3.00
Penna. Steel.	Pa.	25,000,000	168,214	100	5,849,497	Nov. 1905	3.50
Phila. Gas, com.	Pa.	28,953,029	579,061	50	6,684,142	Nov. 1905	.75
Phila. Gas, pf.	Pa.	5,744,813	114,896	50	1,583,505	Mar. 1905	1.25
Pittsburg Coal, pf.	Pa.	32,000,000	297,010	100	11,434,962	Apr. 1905	1.75
Pocahontas Coll., pf.	W. Va.	1,500,000	15,000	100	370,000	May 1906	1.50
Republic I. & S., pfd.	Ill.	25,000,000	204,169	100	2,605,648	Oct. 1906	3.75
Sloss-Sheffield, com.	Ala	7,500,000	75,000	100	562,750	Apr. 1906	2.50
Sloss-Sheffield, pf.	Ala	20,000,000	67,000	100	2,849,000	July 1906	1.75
Somerset Coal.	Pa.	4,000,000	40,000	100	80,000	Feb. 1904	2.00
Standard Oil	U. S.	100,000,000	970,000	100	309,585,000	Sept. 1906	6.00
Tenn. C. & I., com.	Tenn	22,553,600	225,536	100	2,455,353	Aug. 1906	1.00
Tenn. C. & I., pf.	Tenn	248,000	2,480	100	370,170	Aug. 1906	2.00
Texas & Pacific Coal.	Texas	2,000,000	20,000	100	1,930,000	Mar. 1905	2.00
Thirty-three Oil.	Cal	500,000	100,000	5	430,000	July 1905	.10
Union Oil	Cal	10,000,000	100,000	100	1,118,766	May 1905	.50
Union National Gas.	Pa.	9,000,000	90,000	100	1,260,000	Apr. 1905	2.00
U. S. SteelCorp.,cm.	U. S.	550,000,000	5,083,025	100	58,444,003	July 1906	1.00
U. S. Steel Corp., pf.	U. S.	360,281,100	3,603,141	100	162,234,470	July 1906	1.75
Va. Carolina Ch., cm.	U. S.	38,000,000	279,844	100	3,678,829	June 1903	1.25
Va. Carolina Ch., pf.	U. S.	20,000,000	180,000	100	10,740,869	July 1906	2.00
Westmoreland Coal.	Pa.	3,000,000	60,000	50	8,580,000	Oct. 1905	2.50

Canada, Mexico, Central and South America.

Name of Company and Location.		Author-ized Capital.	Shares. Issued.	Par Val. $	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia.	Mex	$480,000	9,600	50	$258,064	Jan. 1905	$1.71
Butters' Salvador, g.	Salv	750,000	150,000	5	600,000	Apr. 1905	.25
Cariboo McKin'y, g.	B. C.	1,250,000	1,250,000	1	546,837	Feb. 1904	.04
Carmen, g. s.	Mex	27,500	1,100	25	117,437	Jan. 1905	2.37
Consolidated M & S.	B. C.	5,500,000	46,988	100	234,480	Aug. 1906	2.50
Copiapo, c.	Chile	1,125,000	112,500	10	3,000,900	Oct. 1904	1.20½
Crow's Nest Pass	B. C.	3,500,000	140,000	25	1,581,148	Apr. 1906	.62½
Dominion Coal, com.	N. S.	15,000,000	150,000	100	1,050,000	Dec. 1903	1.75
Dominion Coal, pf.	N. S.	3,000,000	30,000	100	3,330,000	Jan. 1905	4.00
Dos Estrellas, g. s.	Mex	150,000	3,000	50	1,020,555	July 1905	13.65
El Oro, g. s.	Mex	5,750,000	1,080,000	5	2,708,800	July 1904	.15
Esperanza, s. g.	Mex	2,275,000	455,000	5	3,227,249	July 1906	1.23
Granby Con.	B. C.	15,000,000	1,350,000	10	1,348,630	Sept. 1906	.30
Greene Con., copper.	Mex	8,640,000	864,000	10	5,123,000	Sept. 1906	.40
Greene Con., gold.	Mex	5,000,000	500,000	10	300,000	July 1905	.20
Guanajuato.	Mex	3,000,000	540,000	5	33,750	July 1906	.06½
Guggenheim Expl.	Mex	17,000,000	105,000	100	2,388,750	July 1906	1.75
LeRoi No. 2, g.	B. C.	3,000,000	120,000	25	630,000	July 1906	.24
Mexican Coal & Coke	Mex	5,000,000	50,000	100	600,000	Dec. 1905	3.00
Mex. Con. M. & S. Co.	Mex		240,000		240,000	July 1906	.50
Mines Co. of Am.	Mex	2,000,000	2,000,000	1	2,225,000	Aug. 1906	.01½
N. Y. & Hond. Ros.	C. A	1,500,000	150,000	10	2,137,500	Aug. 1906	.20
Nipissing, S. Co.	Ont	12,000,000	1,200,000	5	180,000	July 1906	.15
North Star.	B. C.	1,500,000	1,300,000	1	351,000	Dec. 1904	1.00
N. S. St. & Coal, com.	N. S.	5,000,000	49,703	100	788,600	Nov. 1904	2.00
N. S. St. & Coal, pf.	N. S.	1,030,000	10,300	100	329,600	July 1906	2.00
Penoles*.	Mex	250,000	2,500	100	7,763,375	June 1906	20.00
Platanillo.	Mex	500,000	206,989	1	2,790	Aug. 1906	.00½
Reco, g. s. l.	B. C.	1,000,000	958,000	1	327,082	Apr. 1906	.02
Slocan Star.	B. C.	500,000	500,000	1	575,000	Dec. 1904	.05
St. Eugene Con.	B. C.	3,500,000	3,202,000	1	402,120	Oct. 1905	.02
Tezuitlan Copper	Mex	1,000,000	10,000	100		July 1906	2.00
Tilt Cove, c.	N. F.	1,000,000	89,000	2	21,360	Jan. 1905	.48
Tyee, c.	B. C.	940.000	180.000	5	136,800	Dec. 1904	.24

*Mexican Currency.

THE MINING INDEX.

The editors of this paper read all the important publications of the world that relate to mining and the treatment of minerals. This index is published as a reference for all interested and to make it impossible for readers of the ENGINEERING AND MINING JOURNAL to miss any important article published anywhere.

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No accounts can be opened for these small amounts, but remittance must be sent with order. For the convenience of those making small but frequent remittances, coupons are furnished at the following prices: 20 cents each, six for $1.00, thirty-three for $5.00 and one hundred for $15.00. This arrangement will be especially appreciated by foreign readers and men in distant mining camps. Where remittances are made in even dollars we will return the excess over an order in coupons upon request.

ALUMINUM.

348—ALLOYS—Aluminum-Bismuth and Aluminum Tin Alloys. A. G. C. Gwyer. (Z. anorg. Chemie, Vol. 49, 1906; pp. 311—319). Discussion of the physical properties of these alloys, showing how tin influences the solubility of bismuth in aluminum.

ASBESTOS.

349—ASBESTOS—Utilidad del amianto. (Madrid Cientifico, July 30, 1906). An outline of the various uses to which asbestos can be put, with a note of its progress in the arts. 20c.

ASPHALT.

350—ASPHALT—Beitrag zum Nachweis von Verfalschugen im Naturasphalt. H. Köhler. (Chem.-Zeit., July 7, 1906). Methods for detecting and estimating impurities in natural asphalt.

351—PRODUCTION of Asphaltum and Bituminous Rock in 1905. E. O. Hovey. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 13 pp.) Gives statistics of production of asphaltic materials in the United States and foreign countries during 1905.

COAL AND COKE.

352—ALASKA—Coal Fields of the Kachemak Bay Region. Ralph W. Stone (U. S. Geol. Survey, Bull. No. 277, Washington, 1906.) Describes the geology, stratigraphy and coal deposits of the region.

353—COAL ANALYSIS—Some Experiments on the Determination of Volatile Combustile Matter in Coals and Lignites. E. E. Somermeier. (Jl. Amer. Chem. Soc'y, Aug., 1906; 11 pp.) Discussion of the limitations of the usual commercial method of analysing coal, showing that discrepancies arise from many variations in the physical properties of samples. This proximate method remains, however, the best that has been devised. 60c.

354—COAL FORMATION—Hypothesis to Account for the Transformation of Vegetable Matter into the Different Grades of Coal. W. D. Smith. (Econ. Geol., June, 1906; 2½ pp.) A criticism of M. R. Campbell's theory as to the genesis of coal. 60c.

355—COAL HANDLING at Penarth Dock. T. H. Riches and T. E. Heywood. (Engineering, Lond., Aug. 3, 1906; 4 pp.) Illustrated description of the mechanical equipment of the plant for handling coal at the above dock, and method of operation. 40c.

355a—COAL HANDLING—Coal Shipping Appliances at Newport, Mon. J. Macauley. (Coll. Guard, Aug. 10, 1906; 2½ pp.) Paper read before the Brit. Instn. of Mechan. Engrs., describing, with illustrations, the hydraulic machinery used at these docks for handling coal. 40c.

356—COAL HANDLING—Electrically Operated Coal Tips. (Elec. Age, Aug., 1906). Illustrated description of electrically operated coal tipples in use at shipping docks of Hamburg, Germany, in which carloads at a time are dumped into the vessels alongside. 40c.

357—COAL HANDLING—Side Tipplers in Coal Dumping. F. W. Parsons. (Eng. & Mg. Jl., Aug. 11, 1906). Describes a conveyor for assisting the removal of coal from a seam, the pitch of which is not sufficient to make the coal run by gravity. 20c.

358—COAL HANDLING—The Shipping of Coal at the Bute Docks, Cardiff. H. S. C. Ree. (Engineering, Aug. 3, 1906; 4½ pp.) Describes and illustrates the lay-out of the shipping docks and the mechanical conveyances for handling the coal. 40c.

359—COAL MINE SHAFT—Charbonnage du Centre de Gilly; Puits Saint-Bernard; Réparation d'un éboulement dans le puits; Emploi de Fagots. A. Pépin. (Annales des Mines de Belgique, T. XI, 3 livr., 1906; 6½ pp.) Report of the author, describing the method of supporting a caved section of a coal mine shaft. Illustrated.

360—COAL MINING—A New Method of Coal Mining. C. Dixon. (Mines & Min., Aug., 1906; 3 pp.) Describes an advance in the laying out of coal mines in thick seams, whereby the advantages of better ventilation and less haulage are secured. 40c.

361—COAL MINING METHOD—Der Abbau unter Anwendung von Versatzleinen am Hangenden und Liegenden auf der Zeche Monopol-Grillo und Seine Vorteile gegenüber dem früheren Abbau ohne Versatzleinen. Bodifee. (Zeit. f. Berg- Hütten- u. Salinenwesen, 1906, Band 54, 3 heft; 2½ pp.) Outlines the system of working a group of not widely separated coal seams.

362—COAL MINING METHODS in the Western Interior Coal Fields. W. R. Crane. (Mines & Min., Aug., 1906). Outlines various compromise systems employed for winning coal in the Western fields. 20c.

363—COAL UNDERCUTTING—Die Verwendung von Schrämmaschinen beim Kohlenbergbau im Ruhrkohlenbezirk, in Nord-Frankreich und in England. Dr. Tübben. (Ztit. f. Berg Hutten u. Salinenwesen, 1906, Band 54, 3 heft; 43 pp.) An exhaustive outline of the use of coal undercutting and boring machines in English and some Continental mines. Illustrated.

364—COAL WASHING—Description du lavoir système Evence Coppée installé au puits Saint-Albert des Charbonnages de Ressaix, Leval, Péronnes et Sainte-Aldegonde. L. Delacuvellerie. (Annales des Mines de Belgique, T. XI, 3 livr., 1906 7¼ pp.) Describes plant and practice at a Belgian coal washery.

365—COAL WASHING—La préparation mécanique des charbons, et un nouveau procédé de transmission de force par courants hydrauliques alternatifs. R. A. Henry. (Soc. de l'Industrie minérale, Comptes rend., June, 1906; 6 pp.) Discusses the results of washing upon various kinds of coal and describes a new system of power transmission, which is particularly applicable to coal washeries.

366—COKE—Vergleichende Untersuchungen von rheinisch-westfälischem Giesserei- und Hochofenkoks. F. Wüst and G. Ott. (Stahl u. Eisen, July 15, 1906; 3 pp.) Gives in tabular form, with brief comments, the result of experiments on a number of different cokes for foundry and blast furnace use made in the Rhenish-Westphalian district, Germany. 60c.

367—COKE OVENS—By-product Coke Ovens in America: Past, Present and Future. E. A. Moore. (Proc., Engrs.' Club of Phila., July, 1906; 22 pp.) Discusses the progress in the adoption of by-product coke ovens, giving the advantages and limitations of this method of making coke. 60c.

368—COLLIERY—An Experimental Colliery. Henry Briggs. (Eng. & Min. Jl., Aug. 4, 1906). Describes the lay-out and operation of a model coal mine run in connection with the University of Birmingham. 20c.

369—COMPARATIVE VALUES OF COALS. R. P. King. (Power, Aug., 1906). Gives notes as to the calculation of a number of coals for the purpose of determining which of the several submitted to the test was really the cheapest. 20c.

370—CONVEYING COAL to the Boilers. F. W. Parsons. (Eng. & Mg. Jl., Aug. 18, 1906). Describes an ingenious scraper conveyor 95 ft. long, the cost of which is $100,-000. 20c.

371—COST OF MINING—The Rate Paid for Mining Hard Coal in the Wyoming and Lehigh Regions. (Coal Tr. Jl., July 11, 1906). An interesting account of the wages paid for mining coal in the above regions of Pennsylvania, together with data on extra costs over and above mere cutting or mining. 40c.

372—ELECTRIC EQUIPMENT—Description des installations pour éclairage et transport de force électrique aux charbonnages de Ressaix, Leval, Péronnes et Sainte-Aldegonde. L. Delacuvellerie. (Annales des Mines de Belgique, T. XI, 3 livr., 1906; 8 pp.) Description of the electric equipment of several Belgian collieries.

373—ELECTRIC MACHINERY—L'Electricité dans les Mines. Bergassessor Beyling. (Annales des Mines de Belgique, T. XI, 3 livraison, pp. 629-639). Gives results of experiments on the dangers to be apprehended from the use of electric machinery in explosive atmospheres.

374—EXPLOSIVE—New Coal Mine Explosive. (Mines & Min., Aug., 1906). Men-

tions the advantages of nyalite for blasting in coal mines. 20c.

375—FORMATION OF COAL FIELDS—W. N. Page. (Mg. Wld., Aug. 11, 1906). A discussion as to the origin of coal seams, in which the author criticises the accepted theory. 20c.

376—HAULAGE—The Goodman Rack Rail System in Gathering and Hauling. (Elec. Mg. July, 1906). Describes the operation of this system of hauling as used at the Cleveland (Iowa) mine of the Whitebreast Fuel Co. 20c.

377—ILLINOIS—The Peabody Mines in Southern Illinois. R. S. Moss. (Mg. Wld., July 21, 1906). Describes the general geology of the district, in which the Peabody mines are the only important operations; also gives an account of the plant at the No. 3 mine. 20c.

378—INDIA—The Dandli Coal Field; Notes on a Visit to the Coal Outcrops in the Kotli Tehsil of the Jammu State. C. M. P. Wright. (Rec., Geol. Surv. of India, Vol. XXXIV, Part 1, 1906; 3 pp.) Records the occurrence of coal at a number of localities in Jammu State.

379—INDIAN COALS—Supplementary Report on the Composition and Quality of a Series of Indian Coals. W. R. Dunstan. (Rec. of Geol. Surv. of India, Vol. XXXIII, Part 4, 1906; 13 pp.) Gives the results of analyses of various coals from the leading coal fields in India.

380—LIFE SAVING—L'Organisation du sauvetage dans les mines françaises. R. Pitaval. (L'Echo des Mines, July 19, 1906.) Outlines the report of the commissioner appointed by the French Government to study the means employed in Germany and Austria for saving life in case of mine fires.

381—LOADING MACHINES—Vessel Loading Machines. (Browning's Indus. Mag., 1906; 17 pp.) Describes several types of car dumpers. 20c.

382—MACHINE MINING—Cost of Installation and Mining Coal by Machines. F. W. Parsons. (Eng. & Mg. Jl., Aug. 18, 1906). Discusses the financial advantage of installing machines for mining coal. 20c.

383—MECHANICAL ENGINEERING OF COLLIERIES — T. C. Futers. (Coll. Guard., July 13, 20, 27, Aug. 3 and 10, 1906). Continuation of lengthy serial dealing with heapsteads, screening and washing plants. $1.00.

384—MINE FIRES—Ueber die Möglichkeit der Entzüdung von Kohlenstaub durch Berührung mit elektrischen Glühlampen. (Zeit. f. Berg.- Hütten- u. Salinenwesen, 1906, Band 54, 3 heft). Outlines a series of tests as to the possibility of setting fire to coal dust by electric incandescent lamps, resulting in the opinion that the danger from this source is not momentous.

385—MONTANA COAL and Lignite Deposits. J. P. Rowe. (Univ. of Mont., Bull. No. 37, Missoula, Mont., 1906; 82 pp.) A lengthy illustrated description of the coal resources of Montana and outline of the present state of the coal mining industry.

386—NATURAL GAS TESTING in Canada. Phillips Thompson. (Eng. & Mg. Jl., Aug. 18, 1906). Reports the observations of the Government gas inspector upon the sulphur contents of gas from different points. 20c.

387—PEAT in the United States in 1905. M. R. Campbell. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 6 pp.) Gives results of some tests of American peat.

388—SAFETY APPLIANCES for Electrical Apparatus in Coal Mines. (Engineering, July 20, 1906). Describes certain protective apparatus to be applied to electric motors used in coal mines, in which the presence of gas adds a dangerous condition. 40c.

389—SHAFT LINING—Charbonnage de l'Espérance à Baudour: Creusement de tunnels inclinés. J. Jacquet. (Annales des Mines de Belgique, T. XI, 3 livr.; 4 pp.) Description of the method employed in lining an inclined coal mine shaft with masonry.

390—SHAFT LINING—Ersatz des Holzausbaues im Wilhelmschacht II des Königlichen Steinkohlenbergwerks König (Saarrevier) durch Eisen-Beton-Ausbau). Hundt. (Zeit. f. Berg- Hütten- u. Salinenwesen, 1906, Band 54, 3 heft; 6½ pp.) Describes the system of lining a coal mine shaft with iron and concrete, and the way in which the hoisting guides are supported. Illustrated.

391—SHAFT SINKING—Charbonnage de Maurage: puits No. 4: Creusement par le procédé Kind-Chaudron. L. Delacuvellerie. (Annales des Mines de Belgique, T. XI, 3 livr., 1906; 4½ pp.) Report on the sinking of a coal mine shaft by the Kind-Chaudron method.

392—TIMBERING—Der Systematische Grubenausbau der Zeche Rheinpreussen, Schacht I-II. (Bergbau, July 19 and 26, 1906). Describes the method of timbering and laying out the mine at this Prussian colliery.

393—VENTILATION—Die Wetterführung der Zeche Neumühl. J. Schmitz. (Bergbau, Aug. 2, 1906; 4 pp.) Describes the ventilating system at the Neumühl coal mine, and makes observations on its atmospheric conditions.

COPPER.

394—ARIZONA—The Silver King Mine. H. E. Brook. (L. A. Mg. Rev., July 28, 1906). Short account of the history and discovery of this mine, which it is stated will probably be reopened as a copper producer. 20c.

395—ARIZONA COPPER COMPANY—Arizona and Sonora. D. E. Woodbridge. (Eng. & Mg. Jl., July 28, 1906). Details the milling system employed at the Arizona Copper Company's new mill at Morenci. 20c.

396—BRASS—Etude générale des Laitons Spéciaux. L. Guillet. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 48 pp.) An exhaustive study by analysis, microscope and testing machine, of ordinary brass and brass containing aluminium, manganese, iron, tin, lead, silicon, magnesium, antimony, phosphorus and combinations of these metals. Illustrated. $1.00.

397—COPPER-CADMIUM ALLOYS. R. Sahmen. (Z. anorg. Chemie, Vol. 49, 1906; pp. 301-310). A study of two series of alloys formed by copper and cadmium.

398—COPPER MATTE—Zur Kenntnis der Natur des Kupfersteins. P. Röntgen. (Metallurgie, July 22, 1906; 9½ pp.) A study for the purpose of ascertaining whether copper matte is a mutual solution of copper sulphide and iron sulphide, or whether it is a chemical compound. 60c.

399—COPPER MINING AND SMELTING—Die Kupfergruben und die elektrolytische Kupferhütte in Miedzianka. W. Stoeger. (Oest. Zeit. f. Berg- u. Hüttenw., July 28, 1906; 4 pp.) Describes the mine and the smelting plant, at which electrolytic methods are extensively employed. 40c.

400—COPPER QUEEN SMELTER—Arizona and Sonora. D. E. Woodbridge. (Eng. & Mg. Jl., Aug. 11 and 18, 1906; 6½ pp.) Describes the plant and operation of this famous copper smelter, at which the steam shovel plays an important part. 40c.

401—IMPURITIES IN COPPER—Effect of Certain Elements on the Structure and Properties of Copper. A. H. Hiorns. (Jl., Soc'y of Chem. Ind., July 16, 1906; 11 pp.) A photo-micrographic study of alloys of copper with the usual impurities in varying proportions, together with study of their cooling curves and the influence exerted upon the copper by the presence of these impurities. 60c.

402—JAPAN—The Great Besshi Copper Mine in Japan. (Mg. Wld. Aug. 11, 1906). Illustrated description of the mines and smelting plant of this famous Japanese copper company. 20c.

403—LAKE SUPERIOR Copper District. W. Spencer Hutchinson. (Eng. & Mg. Jl., Aug. 11, 1906). A general outline of progress on the Keweenaw peninsula. 20c.

404—LAKE SUPERIOR—Five Years of Progress in the Lake Superior Copper Country. J. F. Jackson. (Eng. & Mg. Jl., Aug. 18, 1906). Abstract of paper read at meeting of Lake Superior Mining Inst., Aug., 1906, outlining the present situation at the Keweenaw peninsula, and review of developments during the past five years. 20c.

405—MATTE CONVERTING. H. W. Hixon. (Eng. & Mg. Jl., Aug. 4, 1906). A historical outline of the development of the copper converter and remarks on the necessary modifications of the ordinary converter for the bessemerizing of copper-nickel mattes. 20c.

406—MELTING TEMPERATURE OF COPPER—Remarques sur la Solidification du Cuivre. P. Dejan. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 10 pp.) Records careful observations on the melting temperature of copper, pure, contaminated by oxide and alloyed with aluminium. $1.00.

407—MINE WATER—The Recovery of Copper from Mine Drainage. P. Argall. (Mg. & Sci. Press, July 28, 1906; 2½ pp.) Description of an elaborate plant for recovering copper from mine water by precipitation on scrap iron. 20c.

408—MONTANA—Butte, Mont. W. Spencer Hutchinson. (Eng. & Mg. Jl., Aug. 4, 1906). General considerations of the mining and smelting industry in Butte. 20c.

409—NEVADA—Genesis of the Copper Deposits at Ely, Nevada. J. L. Giroux. (L. A. Mg. Rev., Aug. 11, 1906). Advances a theory of origin for these low-grade copper deposits. 20c.

410—NEW SOUTH WALES—Cupriferous Gold Ores in New South Wales. J. E. Carne. (N. Z. Mines Rec., May 16, 1906; 2½ pp.) Describes the difficulties in the way of working and smelting these ores. 40c.

411—ONTARIO—On the Origin and Relations of the Nickel and Copper Deposits of Sudbury, Ontario, Canada. A. E. Barlow. (Econ. Geol., June, 1906; 8½ pp.) Describes the mineralogy of the Sudbury deposits, and discusses their probable origin. 60c.

412—PERU—La Región Cuprifera de los Alfrededores de Ica y Nazca. F. G. Fuchs. (Bol. del Cuerpo de Ingenieros de Minas del Peru, No. 29, Lima, 1905; 100 pp.) Treats of the topography, petrography, geology and mineral resources of this Peruvian copper district.

413—TACOMA COPPER REFINERY. D. A. Willey. (Eng. & Mg. Jl., July 28, 1906.) Describes the operations of this plant, in which electricity is extensively employed for power. 20c.

FELDSPAR.

414—QUARTZ AND FELDSPAR—The Production of Quartz (Flint) and Feldspar in 1905. Heinrich Ries. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 4 pp.) Gives statistics of production of these two materials.

GOLD AND SILVER.

415—ALASKA—Mineral Resources of Kenai Peninsula, Alaska. Gold Fields of the Turnagain Arm Region, by Fred H. Moffit. Coal Fields of the Kachemak Bay Region, by Ralph W. Stone. (U. S. Geol. Surv., Bull. 277, Washington, 1906; 80 pp.) Describes the geology, stratigraphy and the economic resources of the region, treating of the deposits of gold, copper and coal.

416—COBALT—Notes on Cobalt, Ontario. (Eng. & Mg. Jl., Aug. 4, 1906). General description of progress and conditions at Cobalt. 20c.

417—COLORADO—A Georgetown (Colorado) Mine. T. Tonge. (Mg. Jl., July 21, 1906). Gives a historical outline of the development of the Griffith mine at Georgetown, Colo. 20c.

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419—CYANIDE PRACTICE at the Liberty Bell Mill, Telluride, Colorado. W. E. Tracy. (Eng. & Mg. Jl., July 28, 1906). Describes the system at this mill, the ore being particularly difficult to treat on account of its large content of clay and talc. 20c.

420—CYANIDE—Note on Commercial Cyanide. H. T. Durant. (Eng. & Mg. Jl., Aug. 18, 1906). A strong protest against the inferior quality of much of the potassium cyanide now on the market. 20c.

421—CYANIDE PROCESS—The Homestake Slime Plant. J. Simmons. (Black Hills Mg. Rev., July 20, 1906). Brief description of plant for the treatment of slime now being installed in the Homestake Mining Co.'s new plant at Deadwood. A new form of filter press designed by C. W. Merrill is used, which is said to be nearly automatic in all its operations, thus lowering the cost of labor. 20c.

422—DENVER MINT—The New Denver Mint. R. L. Whitehead and F. E. Healy. (Mines & Min., Aug., 1906; 3 pp.) Description of the equipment of this mint and methods of work, some of which are new. 40c.

423—EXTRACTION OF GOLD AND SILVER—Two Electrochemical Processes for the Extraction of Silver and Gold. M. Vaygouny. (Electrochem. & Met. Ind., Aug., 1906). Discussion of experiments by Mooshegh Vaygouny for the lixiviation of gold and silver from ores without any preliminary roasting. 40c.

424—FINE GRINDING—Pans vs. Tubes. D. P. Mitchell. (Mg. & Sci. Press, Aug. 4, 1906). A protest against the rivalry between tube mills and grinding pans, the author maintaining that these appliances are each suited to different purposes. 20c.

425—FRANCE—Sur la présence d' l'or et de l'argent dans le Trias de Meurthe-et-Moselle. F. Laur. (L'Echo des Mines, July 19, 1906). Describes a rather unusual occurrence of gold and silver in undisturbed sedimentary rocks.

426—GOLD AND PYRITE—The Relations Between Gold and Pyrite. H. L. Smyth. (Mg. & Sci. Press, July 14, 1906). A discussion of the disparity of gold values in pyrite from upper and lower levels of the mine. 20c.

427—GOLD DREDGING. C. W. Purington. (Mg. & Sci. Press, July 28, 1906). A review of the conditions affecting gold dredging in different parts of Alaska. 20c.

428—GOLD DREDGING—The Construction and Operation of Gold Dredging Ma-

chinery. C. L. Cory. (Jl. Elec., Power & Gas, July 21, 1906; 9 pp.) A description of the various types of dredges, with results of their use in certain localities. Illustrated. 20c.

429—GOLD FROM CYANIDE SOLUTIONS—Electrolytic Precipitation of Gold from Cyanide Solutions. B. Neumann. (Electrochem. & Met. Ind., Aug., 1906; 6 pp.) A discussion of the systems employed for precipitating gold by electrolysis, with notes on their several efficiencies. 40c.

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431—GRAVEL MINING—Drift Mining by Shaft. D'Arcy Weatherbe. (Mg. & Sci. Press, July 28 and Aug. 4, 1906; 4 pp.) Description of a method of attacking gold-bearing gravel buried under a capping of extrusive lava. 40c.

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435—MILLING GOLD-BEARING CEMENT. W. J. Williams. (Mg. & Sci. Press, July 28, 1906). A description of the method of mining and the apparatus employed in milling cement gravel in a stamp battery. 20c.

436—NEVADA—The Mines of Cherry Creek. (Salt Lake Mining Rev., July 30, 1906; 2½ pp.) Reports the present situation at Cherry Creek, White Pine Co., Nev. 20c.

437—NEVADA—Wonder, Nevada. W. F. Boeriche. (Mg. & Sci. Press, July 14, 1906). Brief notes on the newest Nevada camp. 20c.

438—ORE SHOOTS. W. H. Weed. (Eng. & Mg. Jl., Aug. 4, 1906). Description of the occurrence of ore shoots in New Zealand, Marysville, Mont., and Guanajuato, Mexico. 20c.

439—ORE VALUATION—The Valuation of Shipping Ores. R. Gilman Brown. (Mg. & Sci. Press, July 14, 1906). Discusses a method by which a factor may be obtained for any particular mine, capable of approximating the smelter returns from an ore, the average mine value of which is known. 20c.

440—ORE TREATMENT PLANT—Description of the Ore Reduction Plant and Process of Reduction on the South Kalgurli Mine. Robt. Allen. (Monthly Jl., Chamber of Mines of W. A., May 31, 1906; 9 pp.) Describes the processes at the So. Kalgurli mill, the essential points being, the use of a ball mill and Merton roasting furnaces, followed by fine grinding with mercury, after which the slime is agitated in cyanide and the gold precipitated in zinc boxes.

441—OREGON—Placer Claims in Southern Oregon. D. H. Stovall. (Mg. Wld., Aug. 4, 1906). Short outline of the present situation in Southern Oregon. 20c.

442 — PRODUCTION — Los Principales Centros Auriferos del Mundo Estudio Sobre la Producción Actual del Oro. M. G. Amador. (Soc. Cientifica "Antonio Alzate," Tome 23, Nos. 7-12; 27 pp.) A general outline as to the source of the world's output of gold.

443—QUEENSLAND—The Norton Goldfield. L. C. Ball. (Queens. Gov. Mg. Jl., June 15, 1906; 7 pp.) Describes the geology, mineral resources and milling practice at the Norton Goldfield of Queensland. 60c.

444—RAND—The Robinson Deep Mine, the Deepest Producer on the Rand. (So. Afr. Mines, June 30, 1906). Abstract of report, presented at a recent meeting of the company, reviewing the operations of the Robinson Deep Mine for the past year. 20c.

445—REFINING — The Manton-Rayfield Refining Process for Gold. H. Knutsen. (Instn. of Mg. & Met., Bull. No. 22; 3½ pp.) Describes this method of refining gold bullion by treating with gases, as applied at the Lady Shenton gold mine of West Australia, together with an account of certain unsatisfactory results obtained by its use at Menzies of the same state.

446—SILVER—Alloys of Magnesium with Silver. S. F. Zemczuzny. (Z. anorg. Chem., Vol. 49, 1906; pp. 400-414). Study of the melting point curves of silver-magnesium alloys, and a discussion of the physical properties of this alloy.

447—SLIMES—A Simple Device for Separating Sands from Slimes. Courtenay DeKalb. (Eng. & Mg. Jl., Aug. 4, 1906). Describes a simple, readily constructed apparatus for the separation of slime. 20c.

448—STAMP MILLS—Experiences in Stamp Mills. Algernon Del Mar. (Mg. & Sci. Press, Aug. 4, 1906). Describes a number of fruitless efforts to operate stamp mills under unfavorable conditions. 20c.

449 — TONOPAH — The Midway Mine. Claude T. Rice. (Eng. & Mg. Jl., Aug. 4, 1906). Description of the work now going on in the development of the ore bodies underneath the overlying andesite. 20c.

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451—TRANSVAL—The Genesis of the Transvaal Ore Deposits. E. A. Ritter. (Ores & Metals, Aug. 1, 1906). A discussion of the origin of the Transvaal gold reefs. 20c.

452—TUBE MILL LINING. (Mg. & Sci. Press, July 28, 1906). Describes an ingenious method of lining tube mills with pebbles set in panels of cement. 20c.

453—WESTERN AUSTRALIA—Goldgewinnungs-Anlagen und -Methoden in West-Australien. C. Göpner. (Metallurgie, July 22, 1906; 11 pp.) Describes the occurrence and the method of milling gold ores at the Oroyo Brownhill gold mine of Western Australia. 60c.

454—WESTERN AUSTRALIA—Metasomatic Processes in the Gold Deposits of Western Australia. Waldemar Lindgren. (Econ. Geol., June, 1906; 15 pp.) A study of the mineralogy of Western Australian gold veins, with the conclusions drawn from them as to the genesis of the ore. 60c.

GYPSUM.

455—GYPSUM and Gypsum Products in 1905. E. C. Eckel. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 15 pp.) Statistics of the production of gypsum and its various products in the United States in 1905.

IRON AND STEEL.

456—BESSEMER PROCESS in the United States. R. W. Hunt. (Iron Age, Aug. 16, 1906; 3 pp.) An address before the recent meeting of the Amer. Inst. of Mg. Engrs. dealing with the development of the Bessemer process in the United States, chiefly as expressed in the improvement in rail mill construction and methods. 20c.

457—BLAST FURNACE—The Nodulising and Desulphurisation of Fine Iron Ores and Pyrites Cinder. A. L. Colby. (Paper before the I. & S. Inst., July 1906; advance sheets; 16 pp., 9 pls.) A description of experimental plant established some time ago for the purpose of converting fine iron ores, flue dust, pyrites cinder, and similar finely divided material into lumps or nodules for use in the blast furnace. A summary of the results obtained is included, and there is also a bibliography of papers on the subject.

458—BLAST FURNACE BLOWING ENGINES, The Development of. D. E. Roberts. (Paper read before the Brit. Instn. of Mechan. Engrs. Aug. 1906). A discussion of several types of blowing engines, particularly in relation to their efficiency.

459—BLAST FURNACE CASTINGS—Direct Castings from the Blast Furnace. W. H. Butlin. (Cassier's Mag. July, 1906; 6 pp.) By careful selection of the ore, it is possible to greatly enlarge the range of articles that can be cast satisfactorily direct from the blast furnace. 40c.

460—BLAST FURNACE GAS ENGINES—The Design of Blast Furnace Gas Engines in Belgium. H. Hubert. (Paper before the I. & S. Inst., July, 1906; advance sheets; 22 pp., 4 pls.) The author gives an account of the gradual development of the gas engine at the works of John Cockerill Co. at Seraing, Belgium, with an account of recent tests of engines running up as high as 1400 h.p.

461—BLAST FURNACE SLAGS—Fusibilité des Laitiers de Hauts-Fourneaux. O. Boudouard. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 4 pp.) A study of the melting curves and temperatures of blast furnace slags in refutation of C. Richardson's objections to the author's previous work on the same subject. $1.00.

462—BLAST FURNACES—Metallurgical Calculations: Heat Balance Sheet of Blast Furnaces. J. W. Richards. (Electrochem. & Met. Ind., Aug., 1906; 3 pp.) Continuation of article previously indexed. 40c.

463—CAR WHEELS—Notes on Car Wheels. R. Meeks. (Eng. & Mg. Jl., Aug. 18, 1906). Notes the variation in the sulphur contents of the metal in different parts of the car wheel. 20c.

464—CAST IRON—The Beneficial Effects of Adding High Grade Ferro-Silicon to Cast Iron. A. E. Outerbridge, Jr. (Fdy., July, 1906). Results of tests on pig iron thus treated. 20c.

465—CRYSTALLOGRAPHY of Iron. F. Osmond and G. Cartaud. (Paper before the I. & S. Inst., July, 1906; advance sheets; 47 pp.) The authors have given a condensed account of their recent investigations into the allotropic transformations of iron. It is illustrated by photographs of a large number of sections taken under the microscope.

466—DRY AIR BLAST—Different Modes of Blast Refrigeration and Their Power Requirements. J. E. Johnson, Jr. (Paper before the July, 1906 meeting of the Iron & Steel Inst., advance sheets; 26 pp.) The author sums up the discussion on the Gayley method of blast refrigeration and gives a careful study of the arguments advanced on the question, together with some theoretical considerations worked out by himself.

467—DRY AIR BLAST—Zur Frage der Windtrocknung. B. Osann. (Stahl u. Eisen, July 15, 1906; 8 pp.) Continuation of the author's comments on Mr. Gayley's experiments with the dry air blast and on the apparatus devised by him for drying the air. In this instalment, careful tabulation is given of the results so far obtained. 60c.

468—ELECTRIC FURNACE—The Kjellin Electric Steel Furnace. E. C. Ibbotson. (Paper before the July, 1906 meeting of the Iron and Steel Inst., advance sheets; 6 pp.) A description of recent results obtained with the Kjellin furnace. Most of these refer to work done since Dr. Haanel's experiments with the furnace a year and a half ago.

469—ELECTRIC SMELTING — Electric Furnace Methods of Iron and Steel Production. J. B. C. Kershaw. (Iron Tr. Rev., July 26, 1906; 2½ pp.) Continuation of article previously indexed, giving a further account of the Heroult process. 20c.

470—ELECTROLYTIC IRON—Magnetic Properties of Electrolytic Iron. C. F. Burgess and A. H. Taylor. (Trans., Amer. Inst. Elec. Engrs., July, 1906; 7½ pp.) A study of the magnetic properties of iron precipitated electrolytically from solution. The need for chemically pure iron is merely a scientific one, since it will serve as a basis for checking ordinary irons. 60c.

471 — FOUNDRY — Neuere Giessereien Deutschlands in den ersten Kahren des zwanzigsten Jahrhunderts. E. Freytag. (Stahl u. Eisen, July 15, 1906; 3½ pp.) Conclusion of a condensed account of foundry practice in Germany at the present time, intended to cover all the improvements that have been introduced in recent years. 60c.

472—FOUNDRY—Pyrometry in the Foundry. R. Meeks. (Eng. & Mg. Jl., Aug 11, 1906. Mentions the advantages of using the pyrometer in the foundry. 20c.

473—GAS BLOWING ENGINE PLANT of the Indiana Steel Co. (Iron Tr. Rev., July 26, 1906; 5 pp.) A description of the large blowing engines built by the Westinghouse Co. for the new plant of the U. S. Steel Corporations. These engines are to be operated with the waste gas from the blast furnaces. 20c.

474—GAS ENGINES—The Application of Large Gas Engines in the German Iron and Steel Industries. K. Reinhardt. (Paper before the I. & S. Inst., July, 1906; advance sheets; 107 pp., 15 pls.) An admirable summary of the history of the application of gas engines in blast furnace plants, and in the operation of electric generation plants in connection therewith. The extent of the development is hardly appreciated. In March of the present year there were at work in German blast furnace plants 203 gas engines having a total of 184,000 h. p. with many more in course of construction.

475—HARD STEEL—Die Stahlsorten und die physikalischen und chemischen Vorgänge beim Härten. K. Poech. (Oest. Zeit. f. Berg- u. Hüttenw., July 14, 1906; 4½ pp.) Records the progress in the manufacture of hard steels, and illustrates the micro-structure of three varieties. 60c.

476—HOT BLAST CUPOLA—A New Hot Blast Cupola. (Fdy., Aug., 1906). Description of the operation of a small cupola using hot blast; illustrated by diagrams. 20c.

477—HIGH SPEED TOOL STEEL TESTS. (Engineering, July 20, 1906). A report of tests on the composition and treatment of steels designed for use in high speed cutters. 40c.

478—IRON-CARBON ALLOYS, the Constitution of. Albert Sauveur. (Paper before the I. & S. Inst., July, 1906; advance sheets; 28 pp.) Largely a discussion of the Roberts-Austen Roozeboum diagram and the investigations upon which it was founded. It also contains some of the results of the author's recent experiments.

479—IRON-CARBON ALLOYS — Ueber das Gleichgewicht und die Erstarrungsstrukturen des Systems Eisen-Kohlenstoff. C. Benedicks. (Metallurgie, July 22, 1906; 10 pp.) Study into the microstructure of steels, showing the condition in which the various constituents are combined. 60c.

480—IRON ORE—An Iron Ore Scarcity Not to be Feared. John Birkinbine. (Iron Age, Aug. 2, 1906; 3 pp.) This paper disputes the general impression that the world's supplies of iron ore are approaching exhaustion. The principal argument is that improved methods of smelting will enable lower grade ores to be successfully used as a source of iron. 20c.

481—IRON ORE—The Lower Iron Content of Lake Ores. (Iron Age, July 5, 1906). The advance report of the American Iron and Steel Assn. shows a general decrease in iron contents of Lake Superior ores. 20c.

482—MOLDING SAND—Notes Sur les Sables a Mouler et sur Leur Emploi en Fonderie. M. Vinsonneau. (Bull. de la Soc. d'Enc pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 16 pp.) Notes on composition, physical nature, preparation and the use of molding sand for foundries. $1.00.

483—MOLDING SAND—The Laboratory Examination of Molding Sand. Heinrich Ries. (Fdy., July, 1906; 16 pp.) Variety of tests for determining the applicability of a sand for certain purposes. 20c.

484—ONTARIO—The Helen Iron Mine, Michipicoten. A. P. Coleman. (Econ. Geol., Vol. I., No. 6, June, 1906; 9 pp.) Describes the topography, geology and ore occurrence of this Ontario iron mine. 60c.

485—OPEN-HEARTH STEEL — Action chimique du Four Martin Acide. M. Deslandes. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 9 pp.) Note on the chemical reaction of impurities in steel made in the acid open-hearth furnace. $1.00.

486—OPEN-HEARTH STEEL—The Influence of Silicon and Graphite on the Open-Hearth Process. A. S. Thomas. (Paper before the I. & S. Inst., July, 1906; advance sheets; 8 pp.) The author has made numerous experiments on the subject to which he refers and while he has ascertained some points to his own satisfaction, he leaves a number of questions to be answered.

487—ORE DEPOSITS—Ueber die Entstehung und Eintellung der Eisenerzlagerstätten. O. Stutzer. (Zeit. f. Berg-, Hütten- u. Salinenwesen, 1906, Band 54, 3 heft; 3½ pp.) A contribution to the discussion of the origin of iron ore deposits, with a genetic classification of them.

488—PERU—Yacimientos de Fierro de Aija y Calleycancha. L. Pflücker. (Bol. del Cuerpo de Ingenieros de Minas del Peru, No. 36, Lima, 1906; 32 pp.) Treats of the geology and the iron ore occurrences of this Peruvian locality.

489—PRODUCTION—Marvelous Increase of Iron and Steel Production. (Iron Tr. Rev., July 5, 1906). Abstract from the advance report of the Amer. Iron & Steel Assn. 20c.

490—PUDDLING—The Development of the Roe Puddling Process. J. P. Roe. (Paper before the Iron & Steel Inst., July, 1906; advance sheets; 32 pp.) The author describes recent work done and some improvements made with the mechanical puddling process of which he is the inventor. The paper is illustrated by drawings and photographs.

491—ROLLED STEEL PLATES—Variations in Strength of Rolled Steel Plates due to Segregation of Carbon. C. L. Huston. (Eng. News, July 26, 1906). Paper read before the Amer. Soc'y for Testing Materials, giving notes on the variation of tensile strength in rolled steel plates as affected by variations in the percentage of carbon. 20c.

492—ROLLING MILL—The Roll Motors of an Electrically Operated Rail Mill. B. Wiley. (Elec. Jl., Aug., 1906; 8 pp.) Describes the use of direct current motors for rolling steel. 20c.

493—RUSSIAN IRON INDUSTRY—Ein Jahrzehnt Entwicklungsgeschichte der russischen Eisenindustrie. B. Simmersbach. (Zeit. f. Berg- Hütten- u. Salinenwesen, 1906, Band 54, 3 heft; 30½ pp.) Outlines the progress in Russian iron metallurgy and trade during the last decade.

494—SAMPLING—Cargo Sampling of Iron Ore at Erie Ports. J. C. Powers. (Iron Tr. Rev., Aug. 16, 1906). Discusses the limitations of the methods of sampling employed at the lake shipping ports 20c

495 — STEEL-HARDENING METALS — The Production of Steel-Hardening Metals, including Nickel and Cobalt, Chromium, Tungsten, Molybdenum, Vanadium, Titanium and Uranium. J. H. Pratt. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 20 pp.) Statistics of the production of the various steel-hardening metals for the year 1905.

496—STEEL INGOTS—Segregation in Steel Ingots. Chas. L. Huston. (Iron Age, July 5, 1906). Series of tests on tensile strength and carbon contents of sample from different parts of steel ingots. 20c.

497—STEEL PLANT—Additions to the Illinois Steel Company's Plant. A New Universal Plate Mill and a Rail Mill. (Iron Tr. Rev., July 5, 1906). Description of the new plants to be erected in South Chicago. 20c.

498—STEEL PLANT—The New Bessemer Steel Plant and Finishing Mills of the Youngstown Sheet and Tube Co. (Iron Age, Aug. 2, 1906; 8½ pp.) Describes in detail, with illustrations, all the departments of this superb new steel plant. 20c.

499—UNITED STATES STEEL CORPORATION'S PLANTS. (Iron Age, Aug. 16. 1906; 2½ pp.) Catalogs the plants under the control of the U. S. Steel Corpn. giving their names, locations, types of furnace and the products. 20c.

500—WALES—Geschichte der Eisenindustrie in Wales. L. Beck. (Stahl u. Eisen, July 15 and Aug. 1, 1906; 13½ pp.) A history of the origin and growth of the iron industry in Wales. The portion so far published brings the paper up to the end of the 18th century. It is in the main a translation and condensation of Charles Wilkins' English work on the same subject. $1.00

LEAD.

501—UTAH—Silver King Mill, Park City, Utah. (Eng. & Mg. Jl., Aug. 4, 1906; 3 pp.) Describes the apparatus employed and the system of milling ores at this famous lead concentrating mill. 20c.

502—UTAH—The Daly-Judge Mill. (Eng. & Mg. Jl., Aug. 11, 1906). Describes the plant and method of operation at this mill in Park City, Utah. 20c.

MAGNESITE.

503—MAGNESITE—The Production of Magnesite in 1905. C. G. Yale. (Extract from Mineral Resources of the United States Calender Year 1905; 4 pp.) Outlines the progress of the magnesite industry in California.

504—MAGNESITE—The Working Magnesite Deposits of California. F. L. Hess. (Eng. Mag., Aug., 1906; 13½ pp.) Describes in detail the occurrence and the condition of magnesite mining in California. 40c.

MANGANESE.

505—MANGANESE—Ueber Manganwiesenerz und über das Verhältnis zwischen Eisen und Mangan in den See- und Wiesenerzen. J. H. L. Vogt. (Zeit. f. prak. Geol., July, 1906; 16 pp.) Describes occurrence of manganese wad ore at several localities, and discusses the ratio between iron and manganese in fresh and salt water bog deposits. 60c.

NICKEL.

506—ONTARIO—On the Origin and Relations of the Nickel and Copper Deposits of Sudbury, Ontario, Canada. A. E. Barlow. (Econ. Geol., June, 1906; 8½ pp.) Describes the mineralogy of the Sudbury deposits, and discusses their probable origin. 60c.

507—ONTARIO—The Sudbury Nickel Region. H. W. Hixon. (Eng. & Mg. Jl., Aug. 18, 1906.) A discussion as to the nature of the intrusive masses at Sudbury. 20c.

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508—KANSAS-OKLAHOMA OIL FIELD. C. N. Gould. (Eng. & Mg. Jl., Aug. 11, 1906). Outlines progress in this mid-continental oil field. 20c.

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510—OIL ENGINES in the Sherman, Texas, Central Station. (Elec. Wld., July 28, 1906). Describes the machinery of an electric generating station operated entirely by Diesel oil engines. 20c.

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512—PETROLEUM in New Zealand. (Times Finan. Supple., June 25, 1906). Historical outline of the development of petroleum in New Zealand.

513—PETROLEUM—The Baku Refining Industry in 1905. (Pet. Rev., July 21, 1906). Statistics concerning the operations of the kerosene and lubricating oil refineries in the Baku district in 1905. 20c.

514 — PETROLEUM REFINING. W. Scott Lysle. (Eng. & Mg. Jl., Aug. 4, 1906). Describes apparatus and method for removing water vapor from particularly viscous petroleum, by the use of compressed air. 20c.

515—UTAH—Oil and Asphalt Prospects in Salt Lake Basin, Utah. J. M. Boutwell. (Pet. Rev., Aug. 4, 1906). Outlines the oil and asphalt resources of the Salt Lake Basin. 20c.

PHOSPHATE ROCK.

516—PHOSPHATE ROCK—The Production of Phosphate Rock in 1905. E. O. Hovey. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 14 pp.) Treats of the occurrence and gives statistics of production in the United States.

PRECIOUS STONES.

517—AMORPHOUS GEM STONES and Nuggets. M. W. Alderson. (Mg. Wld., July 28, and Aug. 4, 1906). Reply to certain criticisms of the author's previous use of the word "amorphous". 40c.

518—DIAMONDS in New South Wales. E. F. Pittman. (N. Z. Mines Rec., May 16, 1906). Describes the occurrence of diamonds in New South Wales. 40c.

519—INDIA—Geology of the State of Panna, Principally with Reference to the Diamond-Bearing Deposits. E. Vredenburg. (Rec. of Geol. Surv. of India. Vol XXXIII, Part 4, 1906; 53 pp.) See Economic Geology-General.

PYRITE.

520—PYRITE—Beiträge zur Kenntnis der Huelvaner Kieslagerstätten. B. Wetzig. (Zeit. f. prak. Geol., June, 1906; 13 pp.) Geological description of the pyrite ore bodies of this famous Spanish locality. 60c.

QUICKSILVER.

521—MEXICO—Description des Mines "La Bella Union" (Etat de Guerrero). Genese des Gisements de Mercure. J. D. Villarello. (Soc. Cientifica "Antonio Alzate", Tome 23, Nos. 7—12; 16½ pp.) Describes the occurrence of the mercury ores of the Bella Union district, and discusses their probable origin.

522—PRODUCTION of Quicksilver in 1906. F. W. Horton. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 16 pp.) Statistics of production, consumption, etc. for 1905.

SALT.

523—SALT—The Production of Salt in 1905. E. O. Hovey. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 13 pp.) Treats of the occurrences of salt in the United States, and gives statistics of production, trade and consumption.

SLATE.

524—SLATE—The Production of Slate in the United States in 1905. E. C. Eckel. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 12 pp.) Gives statistics of production, imports and exports, quotes the average price of slate and outlines the industry by states.

525—SLATE DEPOSITS and Slate Industry of the United States. T. Nelson Dale, E. C. Eckel, W. F. Hillebrand and A. T. Coons. (U. S. Geol. Surv., Bulletin No. 275; Washington, 1906; 154 pp.) A valuable monograph treating in detail the origin, composition, structure and quarrying of slate, with a description of slate deposits in the various states. A bibliography and glossary of slate quarry terms are also given. Profusely ilusrated by maps, half tones, diagrams, etc.

SULPHUR.

526—SULPHUR Mines of Louisiana. D. A. Willey. (Sci. Amer., Aug. 4, 1906). Very general illustrated description of the method of obtaining sulphur from the Louisiana deposits by the Frasch process. 20c.

TIN.

527—TIN—Préparation Electrolytique de l'Etain Spongieux par le Procédé de D. Tomassi. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 3 pp.) Describes the apparatus and the method of making spongy tin by the Tomassi electrolytic process. $1.00.

528—TIN MINING—Das Vorkommen von Zinnstein im Fichtelgebirge und dessen Gewinnung im Mittelalter. A. Schmidt. (Zeit. f. Berg- Hütten- u. Salinenwesen, 1906. Band 54, 3 heft; 6 pp.) Describes the occurrence of tin ore at this locality and the attempts that have been made to treat it.

ZINC.

529—ELECTRIC SMELTING—L'electrometallugie du Zinc. E. Ferraris. (L'Echo des Mines, July 23, 1906). Records small-scale experiments on zinc smelting in the electric furnace.

530—NEW SOUTH WALES—Zinc Industry, Broken Hill. E. Laughton. (Aus. Mg. Stand., June 13, 1906). Outlines the progress made in the utilization of the immense resources of zinc-bearing tailings accumulated at Broken Hill. 20c.

531—WISCONSIN—Is the Drilling Sufficiently Deep in the Wisconsin Zinc District. H. A. Wheeler. (Eng. & Mg. Jl., July 28, 1906). An argument in favor of extending the zone of exploration to below the galena limestone. 20c.

532—WISCONSIN—Ore Milling in Wisconsin. (Eng. & Mg. Jl., July 28, 1906; 3 pp.) Describes the wet concentrating, roasting and magnetic separation of zinc ores in Wisconsin. 20c.

533—WISCONSIN Zinc Fields. (Eng. & Mg. Jl., Aug. 18, 1906). Describes mining methods at Highland and Linden, Wis. 20c.

534—ZINC AND ARSENIC—Zink und Arsen. K. Friedrich and A. Leroux. (Metallurgie, July 22, 1906; 3¼ pp.) Study of the microstructure of combinations of zinc and arsenic, and of the fusion curve of their alloys. 60c.

535—ZINC-ANTIMONY ALLOYS. S. F. Zemczuznyj. (Z. anorg. Chemie, Vol. 49, 1906; pp. 384—399). A discussion of the compound Zn_3Sb_2, showing that this does not form solid solutions with either zinc or antimony.

536—ZINC PRODUCTION in 1905. Chas. Kirchhoff. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 11 pp.) Gives statistics of production, trade and consumption, and outlines the condition of the industry and the market.

ECONOMIC GEOLOGY—GENERAL.

537—ASIA MINOR—Bodenschätze und Bergbau Kleinasiens. C. Schmeisser. (Zeit. f. prak. Geol., June, 1906, 1906; 9 pp.) Enumerates the mineral resources and the present mining operations of this country. 40c.

538—BRAZIL—The Serra do Espinhaço, Brazil. Orville A. Derby. (Jl. of Geol., Aug., 1906; 26½ pp.) Outline description of the topography, geology and mineral resources of the gold and diamond regions of Brazil. 60c.

539—BRITISH CENTRAL AFRICA—Rocks and Minerals from British Central Africa. (Bull. Imperial Institute, Vol. IV, No. 2, 1906; 10½ pp.) Gives the chemical composition and petrography of certain specimens of mineral and rocks collected in Central Africa. 40c.

540—CHINA—La Géologie du Bassin Rouge de la Province du Se-Tchouan (Chine). E. C. Abendanon. (Rev. univ. des Mines, June, 1906; 17½ pp.) General description of the petrography, geology and mineral resources of the Red River valley of China. $1.00.

541—DETERMINATION OF MINERALS in Crushed Fragments by Means of the Polarizing Microscope. A. F. Rogers. (Sch. of Mines Quar., Apr., 1906; 20 pp.) This paper introduces a new method of determining crushed particles under the microscope. The usual optical properties combined with certain simple micro-chemical reactions give a system by which all the common minerals can be determined. 60c.

542—EARTHQUAKE at Socorro, N. M., and Its Relation to Volcanic Activity. A. Lakes. (Mg. Rep., Aug. 2, 1906). Shows that the earthquake at Socorro was principally due to volcanic movements. 20c.

543—EARTHQUAKE—The Investigation of the San Francisco Earthquake. (Pop. Sci. Monthly, Aug., 1906; 31 pp.) Describes the phenomena observed at the shake in San Francisco, and discusses the probable reasons for its occurrence. 40c.

544 — GEOLOGICAL SURVEYS — L'Etat actuel des Recherches Géologiques executées en Europe sous Patronage officiel. A. Renier. (Annales des Mines de Belgique, T. XI, 3me livraison, pp. 649—719). Continuation of article, being a review of the condition of the various European geological surveys, their system of management and the field methods employed by them.

545—INDIA—Geology of the State of Panna, Principally with Reference to the Diamond-Bearing Deposits. E. Vredenburg. (Records of the Geol. Surv. of India, Vol. XXXIII, Part 4, 1906; 53 pp.) Describes the geology, petrography and stratigraphy of the district, with a review of the methods of mining diamonds and a statement of the other mineral resources of the region.

546—INDIA—Notes on the Geology of a Portion of Bhutan. G. E. Pilgrim. (Rec., Geol. Surv. of India, Vol. XXXIV, Part 1, 1906; 14½ pp.) Describes the geology and the mineral resources of this district in the eastern foot-hills of the Himalayas.

547—LAW OF THE APEX—Do the Geological Relations of Ore Deposits Justify the Retention of the Law of the Apex. C. W. Purington. (Econ. Geol., June, 1906; 9 pp.) A strong criticism of the law of the apex. 60c.

548—LIMESTONES AND SULPHIDES—Limestones, Associated with Pyrites and Pyrrhotites of the Appalachian System. F. L. Nason. (Eng. & Mg. Jl., July 28, 1906). Argument seeking to prove that all the sulphide bodies along the Appalachian mountains are replacements of limestones, although the traces of limestones still remaining in that district are exceedingly scarce. 20c.

549—MAGMATIC SEGREGATION in its Relation to the Genesis of Certain Ore Bodies. James Park. (N. Z. Mines Rec., May 16, 1906). A further discussion of this subject, in which various authorities are quoted, and several classifications are given. 40c.

550—Mexico—Descripcion de Algunas Minas de Zacualpan (Estado de México). J. D. Villarello. (Soc. Cientifica "Antonio Alzate," Tome 23, Nos. 7-12; 16 pp.) Gives historical and geological description of the district, and general outline of the ore occurrences of this mining field.

551—MEXICO—Notes on Some Eruptive Rocks in Mexico. F. N. Guild. (Amer. Jl. of Sci., Aug., 1906; 17 pp.) Treats of the petrography of certain eruptive rocks in Mexico, and their classification under the new chemical system of rock naming. 60c.

552—MINERAL WATERS—The Production of Mineral Waters in 1905. M. L. Fuller. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 32 pp.) Gives statistics of production of mineral waters in 1905.

553—NEVADA—Geology of Pioche, Nevada, and Vicinity. F. J. Pack. (Sch. of Mines Quar., Apr., 1906; 33 pp.) Geological discussion as to the stratigraphy, petrography and structure of the Pioche district. 60c.

554—NEW MEXICO—The Dakotan Series of Northern New Mexico. C. R. Keyes. (Amer. Jl. of Sci., Aug., 1906; 5 pp.) A discussion of the stratigraphy of some of the Cretaceous strata of New Mexico. 60c.

555—ORE DEPOSITS—La Genèse des Gisements. L. Demaret. (Annales des Mines de Belgique, T. XI, 3 pp. 542—628). A new contribution on the study of ore deposits, in which the author follows Weed's genetic classification, with a few additions. It is illustrated by the best-known ore deposits of the world.

556—ORE—DEPOSITS — The Practical Inportance of Geology in the Study of Ore Deposits. J. D. Irving. (Yale Sci. Monthly, June, 1906.) A discussion of the circumstances in which a detailed knowledge of the theory of ore deposits may be useful to a mine manager.

557—POLYBASITE Found at Cobalt. W. E. Hidden. (Eng. & Mg. Jl., Aug. 18, 1906). Records the occurrence of this rare mineral at Cobalt, Ont. 20c.

558—PYRRHOTITE—Note sur un Dépot de Pyrrhotine Nickelifere sur une Pointe appelée "Malachite Point." A. Moscovici. (Paper read before the Can. Mg. Inst., March, 1906 meeting). Describes an occurrence of nickeliferous pyrrhotite on Lake Chibogomo, Canada.

559—ROCK PHYSICS—An Investigation into the Elastic Constants of Rocks, more Especially with Reference to Cubic Compressibility. (Amer. Jl. of Sci., Aug., 1906; 29 pp.) Describes a laboratory method for determining the elastic constants of rocks by compression. Gives results of tests on a variety of rocks. 60c.

560—RUSSIA AND INDIA—The Russian Carboniferous and Permian Compared with Those of India and America. Chas. Schuchert. (Amer. Jl. of Sci., Aug., 1906; 16 pp.) Continuation of article previously indexed. 60c.

561—SOUTH AFRICA—Einige Bemerkungen über afrikanische Erzlagerstätten. R. Beck. (Zeit. f. prak. Geol., June, 1906; 4 pp.) Notes on the occurrence of gold and tin in South Africa. 40c.

562—SPAIN—Ueber einige Erzlagerstätten der Provinz Almeria in Spanien. F. F. Fircks. (Zeit. f. prak. Geol., July, 1906; 2½ pp.) Continuation of article previously indexed. 40c.

563—UNDERGROUND WATER—La Science hydrologique; Ses méthodes—Ses récentes progrès—Ses applications. R. d'Andrimont. (Rev. univ. des Mines, June, 1906; 58 pp.) Lengthy paper, outlining the principles of the science of underground water. $1.00

564—UNDERGROUND WATER INVESTIGATIONS in the United States. M. L. Fuller. (Econ. Geol., June, 1906; 15 pp.) Outlines the conditions surrounding the investigations of underground water resources, and describes the present state of this work in the United States. 60c.

565—WASHINGTON—Geologic Atlas of the United States, Snoqualmie Folio, Washington. (U. S. Geol. Survey, Washington, 1906). Describes the topography, general geology, and economic resources of the above area, together with topographic and areal geology maps.

566—BRAZIL—Mining in Brazil. A. Brandenburg. (Eng. & Mg. Jl., Aug. 18, 1906). Outlines the mining situation in Brazil, particularly in regard to gold and diamonds. 20c.

567—BRITISH EAST INDIES—Die bergbauliche Entwicklung und die Metalleinfuhr von Britisch-Ostindien. B. Simmersbach. (Zeit. f. Berg- Hütten- u. Salinenwesen, 1906, Band 54, 3 heft; 7 pp.) A statistical review of mining progress in the British East Indies.

568—CAVING SYSTEM OF MINING. W. H. Storms. (Mg. & Sci. Press, July 14, 1906). Describes the caving system, particularly as applied to the iron mines of Michigan. 20c.

569—COLOMBIA—Mining in Colombia. H. G. Granger. (Eng. & Mg. Jl., Aug 4, 1906). A historical outline of the growth of the mining industry in Colombia, with remarks on its present status. 20c.

570—COMPRESSED AIR—Working under High Air Pressures. M. Vingoe. (Eng. & Mg. Jl., Aug. 18, 1906). Notes the precautions to be observed by workmen in tunnels under river beds, where high air pressure has to be maintained. 20c.

571—CONGO FREE STATE—L'Avenir Industrial de l'Etat Indépendant du Congo. H. Buttgenbach. (Revue Univ. des Mines, May, 1906; 30 pp.) Describes the mineral resources (mainly copper and tin) and development of the Congo territory.

572—EXCAVATION—Calculations of Excavation. S. N. Bell. (Mines & Min., Aug., 1906; 2½ pp.) Describes the surveying method, together with the system of computation for estimating the cubic contents of irregular openings. 40c.

573—FALLING BODIES—How Bodies Fall in Deep Vertical Shafts. F. W. McNair. (Mg. & Sci. Press, July 14, 1906). A discussion of the reasons for the well known phenomenon that a body dropped into a deep shaft rarely reaches bottom. 20c.

574—ILLINOIS—Mineral Production of Illinois for 1905. F. B. Van Horn. (Mg. Wld., July 28, 1906). Gives statistics of the Illinois mineral production in 1905, the principal items of which are coal, clay, stone and cement. 20c.

575 — MEXICO — Northeastern Sinaloa, Mexico. J. A. Mackechnie. (L. A. Mg. Rev., July 21, 1906). Brief notes on the geology of this district and future prospects of its mineral industry. 20c.

576—MEXICO—Three Weeks in Mexico. T. A. Rickard. (Mg. & Sci. Press, July 14 and 21, 1906; 6 pp.) Continuation of article previously indexed, being general notes of a very interesting journey from New York to San Francisco via Cuba and Mexico. 40c.

577—MINE FILLING—Waste Filling of Mines by Flushing with Water. H. Schmerber. (Genie Civil, T. 48, No. 4, and T. 49 No. 5). An illustrated description of the methods of introducing, conveying and distributing sand filling in mines by streams of water.

578—MINE MANAGEMENT—The Successful versus the Unsuccessful Manager. C. Dixon. (Paper read before the Coal Mg. Inst. of America, June 10—20, 1906). Points out the qualifications as well as some of the usual shortcomings of the mine manager. 20c.

579—MINE SHAFTS—Concrete Lining for Mine Shafts. Carl Henrich. (Mg. Wld., July 28, 1906). Enumerates some of the alleged advantages of concrete over timber, and describes methods of applying it to the lining of mine shafts. 20c.

580—MINING COSTS—G. D. Stonestreet. (Mg. Wld., Aug. 4, 1906). Method of keeping track of costs. A specific instance of the sinking of a shaft in South Africa is cited as an example. 20c.

581—MINING COSTS—Some General Principles Governing the Operation of Mines. J. R. Finlay. (Mg. & Sci. Press, July 21, 1906). Analyses the reason for the disparity of mining costs as dependent upon the variety of ores treated. 20c.

582—MINING METHOD A Mining Method for Working a Low Grade Flat Seam. R. B. Nickerson, R. H. Sutton and D'Arcy Weatherbe. (Mg. & Sci. Press, July 14 and 21, 1906). Describes several ingenious methods contributed by various mining men for the handling of a low-grade flat seam, one of the most difficult kinds of seams to deal with. 40c.

583—MONTANA Mining for 1905. E. W. King. (Mines & Min., Aug., 1906). Reviews the progress in Montana mining fields in 1905 and discusses in detail the large concrete chimney at the Butte Reduction Works. 20c.

584—PERU—Recursos Minerales de Jauja y Huancayo. E. I. Dueñas. (Bol. del Cuerpo de Ingenieros de Minas del Peru, No. 35, Lima, 1906; 120 pp.) Detailed account of the mineral resources of these Peruvian districts.

585—PERU—The Mineral Resources of Peru. A. L. M. Gottschalk. (Mg. Wld., July 28, 1906). States the condition of the mining industry in Peru, with a list of occurrences of its most important metals. 20c.

586—QUEENSLAND—Mining in North Queensland. S. E. Beach. (Queens. Gov. Mg. Jl., June 15, 1906). Outlines present condition and the prospects of mining in this field. 40c.

587 — SAMPLING — A Devise Used in Sampling Untimbered Shafts. C. Godfrey Gunther. (Eng. & Mg. Jl., Aug. 11, 1906). Describes an ingenious help for supporting one's self in an untimbered shaft. 20c.

588—SHAFT SINKING—Foncement des Puits de Mine dans les Terrains Boulants et Aquifères. E. Harze. (Revue univ. des Mines, May, 1906; 13 pp.) An improved method of sinking through watery sand by telescoping tubes.

589—SHAFT SINKING—Handling Water in Shaft Sinking. F. W. Parsons. (Eng. & Mg. Jl., July 28, 1906.) Discusses the most economical manner of handling small flows of mine water. 20c.

590—SHAFT SINKING—Schachtabteufen mittels des Gefrierverfahrens in Brzeszcze. F. Drobniak. (Oest. Zeit. f. Berg- u. Hüttenw., July 14, 21 and 28, 1906; 8 pp.) Describes the unfavorable conditions surrounding the sinking of a certain shaft through watery ground, and the system of shaft sinkin by freezing the area. $1.20

591—SIMPLON TUNNEL—Le Tunnel du Simplon. E. Lemaire. (Le Genie Civil, June 23, 1906; 6½ pp.) Illustrated description, with maps, profiles, geological sections, etc., of the tunnel and the method of boring it. 40c.

592—STEAM SHOVEL WORK—The Cost of Steam Shovel Work in Railway Betterment. S. T. Neely. (Eng. News, Aug. 9, 1906; 2½ pp.) Discusses the advantages and the limitations of the steam shovel for making railroad cuts, and gives itemized costs for various kinds of work. 20c.

593—TASMANIA—The Progress of the Mineral Industry of Tasmania for the Quarter Ending 31st March, 1906. W. H. Twelvetrees. (Tasmania, 1906: John Vail, Govt. Printer; 13 pp.) Statistics of the mineral output of Tasmania for the above period.

594—TIMBERING in Swelling Ground. C. T. Rice. (Eng. & Mg. Jl., Aug. 18, 1906.) Describes and illustrates three methods of supporting ground subject to swelling. 20c.

595—TOOLS—Ancient Egyptian Mining Tools. J. J. Bell. (Eng. & Mg. Jl., Aug. 18, 1906.) Describes some antique mining tools found in the Mt. Sinai turquoise mines. 20c.

596—TUNNEL—The Newhouse Tunnel at Idaho Springs, Colo. G. C. Ripley, J. G. Gordon, Jr., W. H. Freeland, Jr. and W. H. Finnigan. (Mines & Min., Aug., 1906; 2½ pp.) Describes the method of driving, haulage, drainage and ventilation of this tunnel at Idaho Springs, together with details of cost. 40c.

597—UTAH—Bingham Canyon, Utah. (Eng. & Mg. Jl., Aug. 18, 1906; 3½ pp.) A discussion of the geology, mineral resources and mining at Bingham Canyon, Utah. 20c.

598—UTAH—The Sierra-Madre District, Utah. W. S. Zehring. (Mg. Wld., July 21, 1906.) Brief general description of the district, which is situated in the Wasatch mountains, about 12 miles north of Ogden, and account of development work done. 20c.

599—VENTILATION—Ventilateurs à pulvérisation d'eau. (L'Industrie, Aug. 5, 1906.) Describes operation of the Koerting system of forcing air through mine pipes by a water injector.

ORE DRESSING.

600—MILLING—The Hanna M. & M. Company's 125-Ton Milling Plant at Capitol City, Colorado. (Mg. Rep., July 26, 1906.) Describes a successful method for treating low-grade sulphide ore by wet and magnetic concentration. 20c.

METALLURGY—GENERAL.

601—ALLOYING—Practical Alloying. J. F. Buchanan. (Fdy., Aug., 1906; 4 pp.) Continuation of serial, this instalment dealing with the question of fluxes for alloys, giving formulas suitable for brass, gun metal, babbitt metal, aluminum, copper, etc. Takes up the question of using highly concentrated alloys for mixing metals. 20c.

602—ALLOYS—Recherches récentes Faites sur les Alliages industriels. L. Guillet. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., 1906; 24 pp.) Review of recent progress in the study of the more important industrial alloys. $1.00.

603—ELECTROMETALLURGY in 1905. J. B. C. Kershaw. (Eng. & Mg. Jl., July 28, 1906.) Outlines the progress during 1905 of electrometallurgy as applied to the various metals, to the treatment of which electricity is applicable. 20c.

604—METALLOGRAPHY—L' Etat actuel de la Métallographie Microscopique. L. Guillet. (Rev. générale des Sciences, July 15 and 30, 1906; 27 pp.) Describes the methods and the apparatus employed in the microscopic study of metals and alloys. 80c.

605—ORE ROASTING—The Use of Pyrometers in Ore Roasting. W. E. Greenawalt. (Eng. & Mg. Jl., Aug. 4, 1906.) Speaks of the necessity for accurately controlling the temperature of roasting furnaces, and describes the use of the Le Chatelier pyrometer. 20c.

606—TESTING MACHINES—Mesure de la Limite Elastique des Métaux. M. Guillery. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 11 pp.) An electric method for securing a continuous and graphic record of a test for the tensile strength of a metal. $1.00

MINING AND METALLURGICAL MACHINERY.

607—AIR COMPRESSOR—Hydraulische Luftkompressionsanlagen. P. Bernstein. (Glückauf, July 21, 1906; 10 pp.) Describes the construction and operation of a modern plant for the compression of air by entangling it in a descending stream of water. 60c.

608—BOILER SETTINGS— C. L. Hubbard. (Engineer, Aug. 1, 1906; 2½ pp.) Describes the advantages of the several methods of setting different kinds of boilers. 20c.

609—COMPRESSED AIR—Recent Extensions of the Employment of Compressed Air. Frank Richards. (Eng. News, July 26, 1906.) Records the advance in the use of compressed air, particularly in the operation of pumps and rock drills, dealing also with the transmission of artificial gas at high pressures. 20c.

610—DIAMOND DRILLING—Die Diamant-Bohrmaschine System Crälius. C. Rauscher. (Montan-Zeit., July 15, 1906.) Describes the principles and records the operation of the Crälius drill on several tests.

611—DRILLS—The Comparative Merits or Air and Electric Drills. G. E. Palmer. (Eng. & Mg. Jl., Aug. 18, 1906.) A discussion of the limitations in the construction of electric drills, and a comparison of tests between an electric and an air drill, 20c.

612—ELECTRIC DRILL—Die elektrisch angetriebenen Kurbelstossbohrmaschinen System Siemens & Halske und Siemens-Schuckert Werke im Kaiser Franz Josef I-Hilfsstollen in Breth. J. Ksanda. (Oest. Zeit. f. Berg- u. Hüttenw., July 21, 28 and Aug. 4, 1906; 12 pp.) Describes the several types of this electric drill, and gives a detailed report of tests in actual mining. Illustrated. $1.60.

613—ELECTRIC HOISTS—De l'électricité appliquée à l'extraction. M. Créplet. (Soc. de l'Industrie minérale, Comptes rend., June, 1906; 3 pp.) Enumerates the advantages of hoisting from mines by electricity.

614—ELECTRIC HOISTS—Les machines d'extraction électriques et leurs résultats. P. Habets. (Soc. de l'Industrie minérale, Comptes rend., June, 1906; 19 pp.) Discusses the use of electric hoisting engines, referring particularly to the Leonard system.

615—ELECTRIC MINE HAULAGE. (Browning's Ind. Mag., Aug., 1906; 5 pp.) Outlines the development of electric locomotives for hauling coal. 20c.

616—ELECTRIC POWER — Commonwealth Electric Company's New Station. (Iron Age, July 26, 1906; 6½ pp.) A profusely illustrated description of the electric generating station in Chicago, in which the power is supplied by steam turbines. 20c.

617—ELECTRIC POWER—Electric Generating Equipment for a Gold Mine. (Elec. Wld., July 21, 1906.) Description of a neat and compact generating plant in Loomis, Washington, erected by the Palmer Mountain Tunnel and Power Co. 20c.

618—ELECTRIC POWER — Electrical Connections for Power Stations. D. B. Rushmore. (Trans., Amer. Inst. Elec. Engrs., July, 1906; 25 pp.) Describes and classifies the various methods of combining the several units of a large generating station. 60c.

619—ELECTRIC POWER—Mining and Milling by Electric Power and Machinery. C. V. Allen. (Eng. Mag., Aug., 1906; 23 pp.) First article of a series, reviewing broadly the application of electric power to mining, principally pumping, haulage and hoisting. 40c.

620—ELECTRIC TRACTION at 2400 Volts on the Line Between Saint-Georges-de-Commiers and La Mure. (Genie Civil, June 2, 1906.) Illustrated description of construction and method of operating this line with an electric locomotive. 40c.

621 — ELECTRIC WELDING. (Eng. Times, July 12, 1906). Brief description of the process of electric welding invented by Prof. E. Thomson, and some interesting applications of this method. 20c.

622—ELECTRICAL MINING NOTES. S. F. Walker. (Mg. Wld., July 28, 1906). Notes of the recent meeting of the American Inst. of Mg. Engrs. in London, detailing in particular the papers treating of the use of electricity. 20c.

623—GAS ENGINES—Design, Construction and Application of Large Gas Engines in Europe. F. E. Junge. (Power, Aug., 1906; 4 pp.) Describes recent progress in the construction of large gas engines, mentioning several details of their construction, by which a greater economy is secured. 20c.

624—GAS ENGINES—L'Etat actuel des moteurs à gaz. H. Hubert. (Soc. de l'Industrie minérale, Comptes rend., June, 1906; 10 pp.) Historical outline of the development of the gas engine.

625—GAS ENGINES—Notes on Large Gas Engines Built in Great Britain and Upon Gas Cleaning. T. Westgarth. (Paper before the Iron and Steel Inst., July, 1906; advance sheets; 8 pp., 11 pls.) A summary of the recent work done in Great Britain in the construction of large gas engines, especially in those operated by blast furnace gases.

626—GAS ENGINES—The Ehrhardt and Sehmer Gas Engines. (Iron Age, Aug. 9, 1906; 2½ pp.) Description of several large German gas engines. 20c.

627—HOIST—An Induction Motor Hoist. C. F. Lehman. (Mg. & Sci. Press, July 28, 1906). A report on the use of an induction motor at the North Star mines in California. 20c.

628—HOIST—An Ingenious Hoist. G. K. Bretherton. (Mg. & Sci. Press, July 14, 1906). Describes a simple method for extending the usefulness of a horse whim. 20c.

629—HOISTING ENGINES—Mine Hoisting Engines. (Engineering, Lond., June 22, 1906). Illustrated description of the hoisting engines at two mines on the Rand and one at Rio Tinto, with general notes on modern hoisters. 40c.

630 — HYDRO-ELECTRIC POWER — Largest Hydro-Electric Installation in Southern Asia, Mysore Province, India. A. C. Hobble. (Far Eastern Rev., June, 1906; 2½ pp.) Describes the electric generating and distributing plant, from which most of the gold mines on the Mysore field of India obtain their power. This plant has been the principal means of reducing the mining costs at some of these mines within recent years. 40c.

631—LIGHTNING CONDUCTORS — Examples of the Protection of Chimneys Against Lightning. (Eng. News, Aug. 2, 1906). Describes various methods of protecting high chimneys against electric discharge. 20c.

632—ORE HANDLING—Hebezeuge und Spezialmaschinen für Hüttenwerke. (Stahl u. Eisen, Aug. 1, 1906; 6 pp.) Illustrated description of electrically operated cranes for handling ore, ladles, converters, etc. 60c.

633—ORE HANDLING—The Latest Ore Handling Machinery on the Great American Lakes. Day A. Willey. (Cassier's Mag., July, 1906; 16 pp.) Illustrated description of the several types of unloading machines in use at Lake ports. 40c.

634—ORE HANDLING—Zur Frage der Bewegung und Lagerung von Hüttenrohstoffen. M. Buhle. (Stahl u. Eisen, July 15, 1906; 3½ pp.) Continuation of article previously indexed, which is devoted to the methods of supplying raw material—ore and fuel—to blast furnaces. The present instalment deals largely with the transportation of coal and iron as practiced in the United States, but it also gives illustrations of one German plant for the handling of ore. 60c.

635—POWER PLANT — A Small Mine Plant. E. R. Dalbey & Co. (Mg. Wld., Aug. 11, 1906). Describes a small power plant for a mine in Chihuahua, Mexico. Illustrated by a plan. 20c.

636—POWER PLANT—Isolated Plant Engineering. P. A. Bates. (Sch. of Mines Quar., Apr., 1906; 15½ pp.) A general discussion as to the best arrangement of small isolated power plants. 60c.

637—POWER PLANTS — Beiträge zur Frage der Krafterzeugung und Kraftverwertung auf Bergwerken. Prof. Baum. (Glückauf, Aug. 4, 1906; 13½ pp.) An exhaustive discussion as to the economy of power plants at various kinds of mines, and the best kind of plant to use in a particular case. 60c.

638—PUMPING—On the Raising of Water by Compressed Air at Preesall, Lancashire. J. Kelly. (Amer. Mach., Aug. 16, 1906; 3½ pp.) Describes the installation of an air lift pump, and gives results of tests on its efficiency. 20c.

639—ROCK DRILL—Trials of the Konomax Drill in South Africa. (Queens. Gov.

Mg. Jl., June 15, 1906). Description of this new drill and the results of its testing on the Rand. 60c.

640—SAFETY CAGES. F. W. Parsons. (Eng. & Mg. Jl., July 28, 1906). Discusses the advantages and limitations of safety cages in general. 20c.

641—SHAFT BEARINGS—Tests of Large Shaft Bearings. A. Kinsbury. (Elec. Jl., Aug., 1906; 6 pp.) Gives a series of tests on the lubrication of large and very heavy bearings. 20c.

642—SKIP—Self-Dumping Skip. (Mg. & Sci. Press, July 21, 1906). Describes, with scale drawings, a recently constructed skip in use at the Florence-Goldfield mine at Goldfield. 20c.

643—SKIPS— Notes on Skips for Compound Shafts. H. L. Templer. (Jl. Transvaal Inst. of Mechan. Engrs., June, 1906; 5 pp.) Describes a new system, by which many of the objections to rapid hoisting in crooked shafts may be overcome. 60c.

643a—SMOKE ABATEMENT. The Removal of Dust and Smoke from Chimney Gases. S. H. Davies and F. G. Fryer. (Paper read before British Assn., Eng., Section, Aug. 2, 1906). A description of a system in use in England for the prevention of the smoke nuisance.

643b—STEAM TURBINES—Recent Advances in Steam Turbines. G. G. Stoney. (Elec. Rev. Lond., Aug. 10, 1906). Paper read before the British Assn., reviewing recent progress in the development of the steam turbine. The use of turbine blowing engines in connection with the blast furnaces, copper and lead smelting furnaces, etc. is described, and their advantages dealt with. 20c.

644—WEIGHING MACHINE—The Blake Denison Weighing Machine. (Eng. & Mg. Jl., July 28, 1906). Describes a weighing machine as applied to a belt conveyor, delivering a continuous stream of ore. Illustrated. 20c.

FURNACES.

645—ELECTRIC FURNACE: Its Evolution, Theory and Practice. A. Stansfield. (Can. Engr., Aug., 1906; 4 pp.) Describes the progress of electric furnace construction, and the materials used in the various types of furnaces. 20c.

646—ELECTRIC VACUUM FURNACE. W. C. Arsem. (Jl. Amer. Chem. Soc'y, Aug., 1906; 16¼ pp.) Describes a furnace in which substances can be treated in a vacuum at high temperature for the observation of their physical properties. 60c.

647—FURNACE CONTROL—Le Controle scientifique de la Marche des Fours industriels. H. Le Chatelier. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 17 pp.) An address in which the famous metallurgist advocates the use of apparatus for noting and controlling the exact conditions prevailing in every part of a metallurgical plant. $1.

INDUSTRIAL CHEMISTRY.

648—ATMOSPHERIC NITROGEN—Artificial Production of Nitrate of Lime by Electric Discharge. J. B. C. Kershaw. (Elec. Wld., July 21, 1906.) Description of a plant for making artificial fertilizer by fixation of atmospheric nitrogen. 20c.

649—ATMOSPHERIC NITROGEN—Die Frage der Technischen Ueberführung Nitroser Gase in Salpetersäure oder Salpetersaure Salze. J. Klaudy. (Zeit. f. Elektrochem., Aug. 3, 1906; 6 pp.) Discusses the possibility of making nitrogenous substances commercially out of the air. 40c.

650—ATMOSPHERIC NITROGEN—Ueber die analytische Bestimmung von Stickoxyd in Luft, Sowie über die dabei eintretenden Reaktionen. M. Le Blanc. (Zeit. f. Elektrochemie, Aug. 3, 1906; 4 pp.) Describes a method of determining nitrogen in the air. 40c.

650a—BABBITT METAL—J. F. Buchanan. (Amer. Mach., Aug. 2, 1906). Describes the method of making the alloy, and states the advantageous preparations for particular uses. 20c.

651 — BISCHOF WHITE-LEAD PROCESS. W. Ramsay. (Eng. & Mg. Jl., Aug. 18, 1906). Abstract of paper read before the Sixth Congress of Applied Chemistry at Rome, May, 1906, describing a short method of making white lead, in which the lead is first oxidized, and then carbonated. 20c.

652—CALCIUM NITRATE—Ueber Darstellung von Kalkstickstoff. Dr. Eriwein. (Zeit. f. Elektrochemie, Aug. 3, 1906; 7 pp.) Describes a method of making calcium nitrate by the electric furnace at the works of the Piano d'Orta in Pescara valley, Italy. 40c.

653—CARBON DIOXIDE—The Production of Carbon Dioxide. M. L. Fuller. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 9 pp.) Speaks of the method of making carbon dioxide, its use, treatment and conveyance.

654 — COAL DISTILLATION PRODUCTS — Die Braunkohlenteer-industrie im Jahre 1905. E. Graefe. (Chem.-Zeit., July 14, 1906). Describes the progress of the tar and allied industries during 1905.

655—COPPER SULPHATE—Manufacture of Cupric Chloride and Its Transformation into Sulphate of Copper. (Rev. des Prod. Chimiques, July 15, 1906). An outline of a method by which copper is first dissolved by chlorine and then transformed into sulphate.

656—ELECTROGALVANIZING—Its Uses and Methods of Production. (L. & Z. News, July 30, 1906; 2½ pp.) Outline of the method and the materials employed for galvanizing iron by electrolytic methods. 20c.

657—EXPLOSIVES—The Manufacture of High Explosives. W. H. Booth. (Cassier's Mag., Aug., 1906; 18 pp.) Describes and illustrates the plant, machinery and the method employed in the manufacture of high explosives at the Cotton Powder Co.'s plant at Faversham, England. 40c.

658—HYDRO-CARBONS—Fabrication d'hydro-carbures et élimination du soufre. (Jl. du Pétrole, July 20, 1906). Describes H. S. Blackmore's process for making gas-enriching vapors from calcium carbide. 20c.

659—PETROLEUM—L'Odeur des Pétroles. J. Girard. (Jl. du Pétrole, July 1, 1906). Describes methods of deodorizing crude petroleum by salts of lead and manganese. 20c.

660—POTASH SALTS—Die Primäranlagen und die Hauptschachtfördermaschine der Gewerkschaft Wintershall, Heringen a. d. W. Rosterg. (Glückauf, July 28, 1906; 15½ pp.) Describes the equipment and methods of operation of this potash salt works. 60c.

ANALYTICAL CHEMISTRY.

661—ASPHALT AND OILS—The Relations Between Some Physical Properties of Bitumens and Oils. A. W. Dow. (Eng. Rec., Aug. 18, 1906). Describes a series of tests, by which the qualities of asphalts and oils can be determined, with the results on several varieties. 20c.

662—BALANCE—The Equal Arm Balance. V. H. Gottschalk. (West. Chem. & Met., Mar., 1906). A discussion as to the relation between load and sensibility of the ordinary analytical balance. 60c.

663—CADMIUM—Determination of Cadmium. C. Goldschmidt. (Zeit. anal. Chem., Vol. 25, 1906; 344 pp.) Simple method for the quantitative precipitation of cadmium from solution by enclosing it in an aluminum vessel with the addition of small quantities of chromium nitrate and cobalt nitrate.

664—CARBON DIOXIDE, Method of Determination. (Chem. Zeit., June 23, 1906).

665—CHEMICAL ANALYSIS—Theoretical Principles of the Methods of Inorganic Analysis. G. Chesneau. (Annales des Mines, T. IX., 1906; pp. 139—249, 255—315, 373—440).

666—COPPER AND ZINC—Analyse du Cuivre et du Zinc Industriels. A. Hollard and L. Bertiaux. (Bull. de la Soc. d'Enc. pour l'Ind. Nat., Revue de Metallurgie, July 1, 1906; 12 pp.) Several methods for the determination of the usual impurities found in commercial copper and zinc. $1.00.

667—ELECTROLYSIS—Les récents Progrès de l'Analyse électrolytique. O. Dony-Hénault. (Rev. univ. des Mines, June, 1906; 9½ pp.) Reviews the means and methods of analysis by electrolysis. $1.00.

668—GOLD AND PLATINUM—Detection of. J. Peterson. (Zeit. anal. Chem. Vol. 25, 1906; pp. 342—344). A method for the detection of gold and platinum in solutions containing several other metals.

669—HYDROGEN SULPHIDE—An Economical and Satisfactory Apparatus for Supplying Hydrogen Sulphide to Laboratories. R. E. Remington. (West. Chem. & Met., Mar., 1906; 2½ pp.) Describes a simple apparatus capable of suppling hydrogen sulphide at several points in the laboratory. 60c.

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673—PLATINUM METALS—Zur Tecknik der Analyse von Platinmetallen. N. A. Orlow. (Chem.-Zeit., July 21, 1906). Describes the reactions of hydrogen peroxide with osmium, and of silver ioxide with palladium chloride.

674—SOLUBILITY OF PLATINUM—The Attack of Platinum by Sulphuric Acid. J. M. Quennessen. (Chem. News, June 15, 1906). Results of tests on the solubility of platinum in sulphuric acid, which show that with comercial acid the presence of atmospheric oxygen assists the solution.

675—TANTALUM—The Estimation of Tantalum by Marignac's Method. A. Tighe. (Jl., Coc'y of Chem. Ind., July 31, 1906). A criticism of the Marignac method as given in the text books. The author finds it necessary to determine tantalum and niobium.

MATERIALS OF CONSTRUCTION.

676—CEMENT INDUSTRY in the United States in 1905. E. C. Eckel. (Extract from Mineral Resources of the U. S., Calendar Year 1905; 28 pp.) Statistics of production and trade in the various kinds of cement in the United States in 1905 and previous years.

677—CEMENTS—Methods for Testing Cements for Water-Proofing. W. P. Taylor, (Cement Age, Aug., 1906; 4½ pp.) Describes apparatus and tests employed for determining the water proof qualities of cement. 20c.

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